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THE ENGINEERING AND MINING JOURNAL.

RICHARD P. ROTHWELL, C. E., M. E.
ROSSITER W. RAYMOND, Ph. D. } Editors.

NOTE.—Communications relative to the editorial management should be addressed to Mr. ROTHWELL. The articles written by Mr. Raymond will be signed with a star.

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MR. AUSTIN GALLAGHER has been appointed Secretary of the Scientific Publishing Company, vice WILLIAM VENTZ, deceased. Correspondents will please note that remittances should, invariably, be made to the order of the *Scientific Publishing Company*, and *not* to the President or Secretary.

THE Rand and Waring Drill and Compressor Company ask in our advertising columns for the results of experiments in the use of peat fuel for steam boilers. Will not some of our readers, familiar with the subject, answer them through our columns, and thus place on record valuable information?

The Philadelphia Office of the Engineering and Mining Journal, formerly at 30 North 5th Street, has been removed to 434 Walnut Street. MR. B. BLOMFIELD—our accredited agent, in which capacity he has represented this paper during the past two years in Philadelphia—will be pleased to give such information as may be desired with regard to advertising, special illustration of machinery, etc., etc., intended for the Centennial Exposition, and other business matters connected with his department.

The Fryer Process.

OUR recent article on this subject has called out some remonstrances from the representatives of the company owning the patent, and from correspondents of high character, who assure us that, although they are not at liberty to speak of the details, the process is in fact successful. To all such, we can make but one reply. We shall waste no time in commenting upon secrets. When the full details of the FRYER process shall have been made public, we shall be able to appreciate and criticize its claims. Hitherto, we have discussed its patented features only, which we assume to have been correctly described in the patent, because if they were not so described, the patent would be void. We have no interest in the matter on either side; but we shall certainly not retract or modify our perfectly sound and reasonable comments on the FRYER roasting-apparatus, as shown in the patent. If the process is successful with that apparatus, then it could be made still more successful without it—that is all. *

The Latest Information on Water-Gas.

WE have sometimes intimated that, among our gas-works managers, are many, whose practice is not fully up with the present state of the science of gas-making. Such a state of things can scarcely be wondered at, when we consider that they have, till recently, looked for their information chiefly to the *Gas-Light Journal*. This, in its endeavor to be "as reliable and interesting as possible," gives what is called "a carefully compiled" synopsis of the efforts that have been made to produce illuminating gas from *hydrogen* (meaning, probably, water-gas). This turns out to be merely the chemist HOFFMANN'S very imperfect digest which has lately been going the rounds, and in which the latest information, about American water-gas, relates to the first GWYNNE-HARRIS experiments made in 1865, just eleven years ago.

No allusion is made, in this "carefully compiled" and valuable synopsis, to the investigations of Professors SILLIMAN and WURTZ made at Fair Haven, in 1869, and extending over five months, during which more than half a million feet of water-gas were made. These, by far the most elaborate and thorough chemical investigations ever made in connection with a gas subject, were not even referred to by HOFFMANN, and this omission was not discovered by our conservative contemporary. On the contrary, in speaking of water-gas, we are told, editorially, that a "careful study" of this imperfect digest of HOFFMANN'S will enable us to "form a conclusion as to the probability of success" of water-gas processes, which are now in full and successful operation at Utica, Poughkeepsie and elsewhere in this country. HOFFMANN'S account of European experiments seems to be confined to modifications of the old GILLARD invention of the platinum wire cage in the flame, which no one, of any scientific or practical attainments, would have thought of reviving at any time within the past twenty years. We will quote HOFFMANN'S closing objection to water-gas—an objection whichour contemporary, editorially, endorses, by referring us to it as indicating the prospects of success or failure in this direction.

HOFFMANN says, one of the objections to water-gas "depends on the high coefficient of diffusion of hydrogen, and its consequent ready escape through the pores and fine chinks in the mains, etc. Has Prof. HOFFMANN discovered that hydrogen will "diffuse" away from carbonic oxide; and does he not know that water-gas has a density as high, and, therefore, a diffusive coefficient as low as ordinary coal-gas? If we take the composition of water-gas as given by Prof. CHANDLER in his address before the Gas-Light Association (see ENGINEERING AND MINING JOURNAL of 15th Jan.), *half hydrogen, and half carbonic oxide* its density would be $\frac{\cdot0693+\cdot967}{2}=\cdot5181$, or much above that of average gas from coking coal. Prof. CHANDLER is, however, evidently in error in this composition; had he consulted the report of Professors SILLIMAN and WURTZ, already referred to, he would have found that, in actual practice, the crude water-gas contains about 30 per cent., and the purified about 36 per cent. of carbonic oxide, with about 4 per cent. of marsh-gas. According to this composition, the density would be ·412, or about the same as that of an ordinary 14 to 16-candle coal-gas, when free from air, such as we are favored with by most of our gas companies.

When Professor CHANDLER states that gases containing carbonic oxide are so easily blown out as to be valueless, does he get his information also from HOFFMANN'S record of experiments on the old GILLARD wire cage? If he has other data, it would be of interest to the manufacturers of water-gas to know the fact.

Our National Surveys.

WE reprint from the January *Galaxy* extracts from an article under the above title, from the pen of Capt. CHARLES W. RAYMOND, of the U. S. Engineer Corps, regretting that our limited space prevents us giving it in full. The subject to which it refers is important enough to deserve far more public discussion than it has received. No one who has given it any consideration can fairly deny that, whatever may be the true system under which the surveys of the national domain should be conducted, the present state of things—we will not call it a system—is the worst that could be devised. Almost every Executive department dabbles in the work. HAYDEN under the Secretary of the Interior, POWELL under the Smithsonian Institution, WHEELER under the Chief of Engineers, JANNEY under the Indian Bureau, various infantry and staff officers under the commanders of military districts, and special agents of all sorts, are sent on explorations, surveys, reconnoissances, and inquiries, without any common plan of direction, or harmony among themselves. Six or seven years ago, CLARENCE KING was appointed by the Chief of Engineers to conduct a thorough survey, within definite bounds. A strip of country was specially designated; and the work was performed, as all parties admit, in excellent style. The resulting volumes, prepared with great care, and the maps of the survey, are in course of publication. But meanwhile a perfect procession of "government geologists" and explorers has gone, at the public expense, into parts of the same field, picking out such interesting or famous localities as seemed most likely to furnish popular material, performing hasty work, and publishing hasty reports, over which there has been no censorship, and which have been worse than unnecessary, because they have imperfectly or erroneously represented what had already been examined thoroughly and was about to be thoroughly described. Aside from the fact, becoming clearer every day, that in many cases these repeated "preliminary" excursions have brought confusion and bred dispute, instead of developing the truth concerning the geology of the West, it is self-evident that the government ought not to be paying indefinitely for such indefinite results, and sending rival parties over and over the same ground. The case appears still worse when it is seen that the heads of various parties spend much time every year in lobbying for appropriations, with which to continue their independent operations. We say, without reference to the relative merits of individuals, that this evil is as bad as bad can be. It is as demoralizing to scientific men as it is wasteful of the public money; and its final reaction will be, if a reform is not made in time, the suspension of all surveys and explorations, as the only way to end strife, confusion, and expense.

Why is it, that those who oppose the control of this whole work by the Engineer Bureau have not moved earnestly for the creation of a special civil bureau for that purpose? The reason is simple. So long as the present condition could be maintained, the independent commanders of surveys would be personally much better off than under any sort of superintendence that could be devised. They could direct their own operations, publish reports without impertinent inspection from any superior, put their own names on the title-pages, and gain large and quick harvests of popular appreciation. We can scarcely blame them if they preferred to continue this state of things. And we will not undertake to say that it has always proved an unqualified evil in the past. It is sufficient to say that it is now an evil, undoubted and grievous.

Captain RAYMOND states the case forcibly, but we think, candidly, much might be added in the way of historical proof. Very much might be said in the way of criticism of the publications which have emanated from the various chiefs of guerilla explorations. All these volumes are treated by the general public with equal respect. The scientific halo is supposed to surround them

all; and yet experts are well aware that much error has thus been set forth to mislead the future student or traveler; and much pretence put forward, to make noise pass for news. Some of our ambitious geographers have renamed mountains, and sent the maps with their new names, in a great hurry, over to the unsuspecting PETERMANN. Some, it is said, have poached on the bone-deposits discovered by their rivals, and by sharp practice got the start in describing new species; so that a deluded posterity may be led to regard what should have been the *monstrum horrendum* SMITHII as the ditto ditto JONESII—not much to us perhaps; but a great outrage to SMITHIUS. But of all this, Capt. RAYMOND takes little notice. His chief personal attack is on Professor WHITNEY, whose articles on this subject in the *North American Review* have certainly not displayed much knowledge or candor, and who will find it difficult to explain away the calm but conclusive exposure which is here made of his method and temper in treating so important a question.

We consider that Capt. RAYMOND has made out his case. We are convinced that the national surveys should be conducted and the national map constructed under the superintendence of the Engineer Bureau, and that civilians who seek employment in such work should submit to the supervision of that Bureau—the only one competent to the work.

But the Engineer Bureau, on the other hand, is partly to blame for the confusion which now exists, and for the danger with which it is itself threatened, of losing control of the geodetic public work. It should have vindicated itself long ago, and proved its earnestness by organizing a comprehensive plan. Instead of that, it has allowed the matter to drift along, and has left to Lieut. WHEELER, a young, ardent, and adventurous explorer, the duty of representing the claims of his work before Congressional committees, just as if he were one of the independent operators. The Bureau should have backed its own work with all the power it possessed, and it should have taken pains that publications made under its auspices were in all respects worthy of such endorsement as is thus given them. This it is at last bestirring itself to do; and despite its shortcomings in the past, we consider it, beyond doubt, the best, if not the only, agency by which this branch of the public work can be suitably controlled. *

NEW PUBLICATIONS.

COAL MINING. E. & F. N. SPON. New York. Price $2 50 each part.

THE VI., VII., VIII., and IX. Parts of "ANDRÉ'S *Treatise on Coal Mining*," have been issued by the Publishers, E. & F. N. SPON, London and New York.

This work is carrying out the promise it gave in the first number, of being the most valuable treatise in the language on the general subject of coal mining.

One of the points of excellence in this work is that it completely omits all the detailed descriptions of obsolete methods of mining which have to be waded through in many of our best books on mining. It treats of coal mining as practiced to-day, and as the author has called to his aid the latest French and German works, as well as the English, on the subjects treated, he has made his book of real practical value. It is announced that the book will be concluded in 12 parts, 9 of which have now appeared.

Part VI. treats of shaft sinking.

" VII.—Driving levels or narrow work.

" VIII.—Systems of working—getting the coal.

" IX.—Haulage.

The typographical execution of the work is excellent, and the illustrations are well drawn.

We commend the book to our mining engineers and managers of coal mines.

POPULAR SCIENCE MONTHLY, for February. APPLETONS.

EXPLORATION OF THE COLORADO RIVER OF THE WEST. By Major J. W. POWELL. Washington.

THE LIFE OF GEORGE AND ROBERT STEPHENSON. By SAMUEL SMILES. HARPER & BROTHERS. New York.

THOUGH this is no "New Publication," it is a book that can be taken up again and again with pleasure. There is a never-failing interest attached to the introduction of railway engineering, and this interest naturally centers in the STEPHENSONS, father and son, as those who have contributed most largely to it. No Engineer's library should be without this most interesting history of railroad engineering, for it is that as much as a life of the great railroad engineers.

Our miners will be interested in reading the trials and successes of the inventor of the "Geordy," or STEPHENSON Safety Lamp, the *safest* yet discovered.

Centennial Commission.

AMERICAN SOCIETY OF CIVIL ENGINEERS.

SUB-COMMITTEE XII.

METALLURGICAL ENGINEERING.

NEW YORK, Jan. 21, 1876.

SIR—This Commission has succeeded in obtaining a very desirable room in the main exhibition building, to be used as a secretary's office and as a museum of drawings, illustrating the *progress of American Engineering during the century.*

It is now ascertained that farther space will be provided for the Society of Civil Engineers, if they will guarantee to fill it with drawings, models, etc., which shall illustrate consecutively the development and state of engineering improvement.

In various departments of engineering, extensive and interesting collections are promised. It seems most desirable that in Metallurgical Engineering, the importance and progress of which have been more conspicuous, perhaps, than those of any other branch, a creditable exhibit should be made.

In order, however, to secure any more space, it will be absolutely necessary to inform the officers of the exhibition *within a very short time.* There is time enough to collect the necessary drawings and models, all of which are in existence, and need only to be got together; but the collection will be of no avail, for want of room to exhibit it, unless the commission can guarantee a specific amount of space.

Will you, therefore, please answer, as soon as possible—within a few days—the following questions:

I. *Will you send to this commission by the middle of April, or before, any models or drawings referred to in the following list? and if so,*

II. *What important drawings of old or modern plant will be framed, and about what wall-space will they occupy in the aggregate?*

III. *About what number of sheets of working drawings, old and modern, and on what general subjects, will you send for exhibition (under the care of the commission) in portfolios?*

IV. *What models or machines will you exhibit, on what subjects, and what floor space will they occupy?*

Your prompt attention to these inquiries is earnestly solicited. The trouble and expense of selecting suitable drawings, models, etc., will, in most cases, be small, but the usefulness of such an exhibition, to the profession and to expert visitors, can hardly be overestimated.

Address, A. L. HOLLEY,
(Chairman Sub-committee on Metallurgical Engineering,)
56 Broadway, New York City.

DRAWINGS AND MODELS,

ILLUSTRATING THE EARLY STAGES, DEVELOPMENT AND PRESENT STATE OF AMERICAN METALLURGICAL ENGINEERING.

NOTE.—Historical drawings will be useful, even if they are soiled or damaged. Ordinary working drawings, or even sketches, if important, are solicited.

All drawings should be dated in large figures, and if practicable, general explanations and historical facts should be written upon or attached to them.

I. IRON AND STEEL.

Blast Furnaces.—Stacks, stoves, blowing apparatus and arrangement.
Direct Processes.—Sponge and bloomery plant and apparatus.
Puddling.—Furnaces and mechanical appliances.
Rolling Mills and Forges.—Roll-trains, hammers, squeezers, engines, boilers, or other driving power, heating-furnace (coal and gas), special machines for shaping metals, such as spike, nail and horse-shoe machines, tuyere mills, etc.
Bessemer Machinery.—Details and general arrangement.
Open-Hearth Steel.—Plant and apparatus.
Crucible Steel.—Plant and apparatus.

II. METALLURGY, OTHER THAN IRON AND STEEL.

Gold, Silver, and Copper.—Mining plant and machinery.
Gold and Silver.—Machinery for amalgamation and humid process.
Gold, Silver, and Lead.—Smelting plant and machinery.
Zinc, Nickel, and Quicksilver.—Mining and metallurgical machinery.
Roasting and Calcination.—Plant and machinery.

III. MINING.

Quarries, Open-work, and Hydraulic Mining.—Works and machinery.
Tunnels and Shafts.—Works and machinery.
General underground work in coal mines.
General underground work in metal mines.
Pumping and Ventilation.—Works and machinery.
Mechanical Preparation of Ores.—Plant and machinery.
Labor-saving Machinery.—Coal-cutters, rock-drills, etc.

IV. FUEL.

Mechanical Preparation of Fuel.—Plant and machinery.
Coking Ovens and Apparatus.
Hydro-carbon Fuels.—Apparatus for burning.

NOTE.—Space can probably be found for historical machines or characteristic parts of machines. Some of great interest will be exhibited in other engineering departments.

Notes.

Chicago Gas Supply.—The City Council has passed an ordinance making a contract with the Globe Gas-Light Company to support 2,000 street-lamps at $44 per lamp per annum. This is a great reduction from the old prices. Moreover the old gas company had refused to extend its mains into some of the newer portions of the city on the plea of the expense being too great. Now the President of the old (West Side) Gas Co. says, that there is a misapprehension in the public mind in regard to his company. He says that the company is not poor, and that it is ready to extend its "mains" and *give the city gas at a less price than at present.*

Galvanic Deposition of Bismuth.—BERTRAND succeeds in obtaining a galvanic deposit of bismuth by employing a double chloride of bismuth and ammonium. This salt, is white, crystalline, very soluble in water, and is not precipitated by a slight excess of hydrochloric acid. It is best to operate in the cold and with a solution of from 25 to 30 grammes of the salt in a liter. Precipitation is easily effected by a single BUNSEN element, with a DANIELL'S it is slower. At the end of the operation the brass or copper objects have a blackish tint, below which the bismuth, which adheres firmly, appears with its characteristic luster, midway between that of antimony and old silver. The deposit takes a fine polish. In an analogous manner a double chloride of antimony and ammonia gives a deposit of antimony.

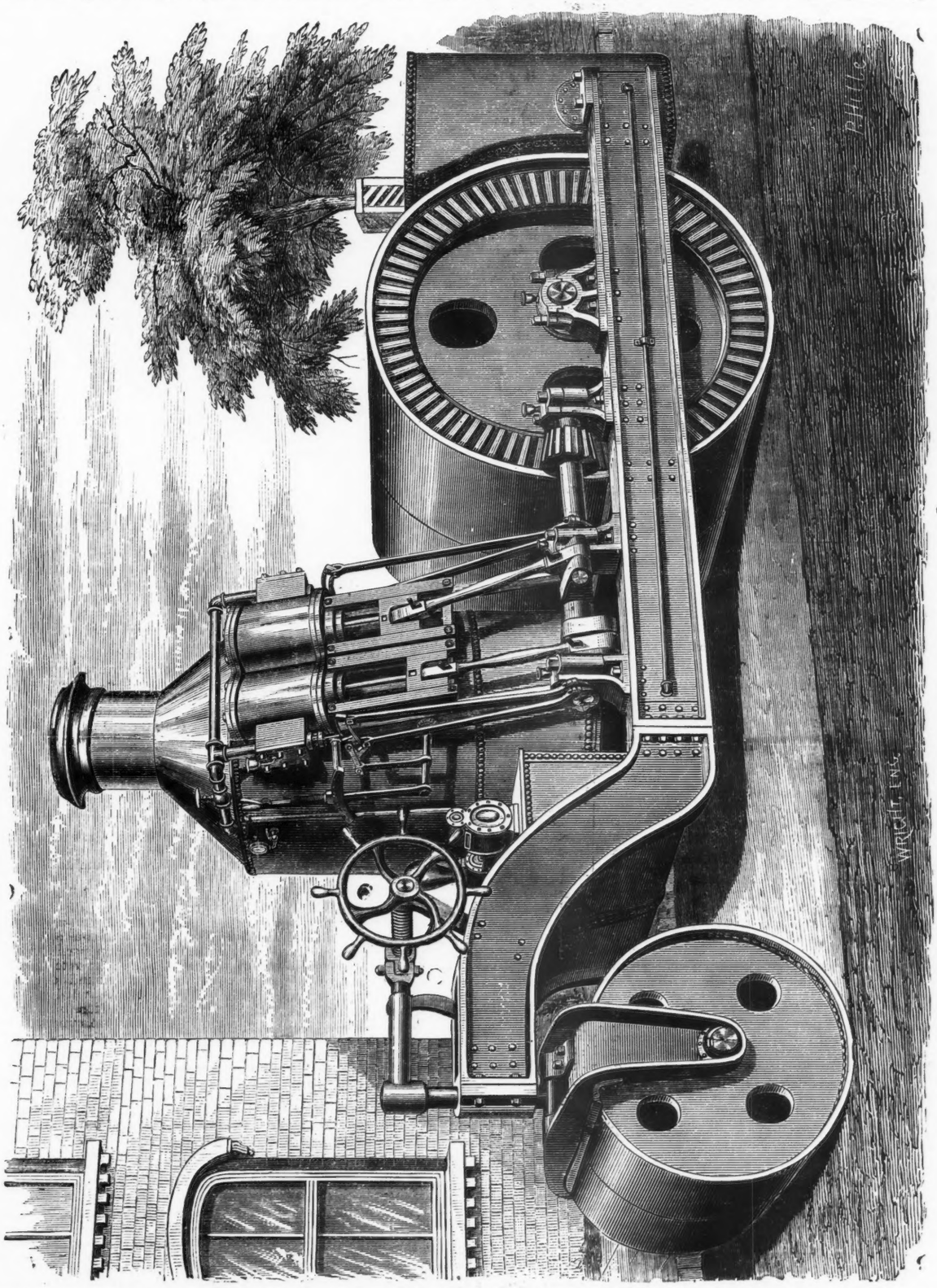
Maryland Coal Tax.—It is stated that many of the coal companies operating in Western Maryland have combined to reduce the price of mining coal from 65 to 50 cts. per ton, said reduction to obtain on the 1st of February. It is claimed that the coal product is diminished because of the high rate hitherto paid for mining. This action will probably be hastened by the probability of the passage by the Legislature of a bill recently reported favorably by the Senate's Finance Committee, imposing a heavy license fee upon coal operators. The license fee is to be $20 per annum for each 1,000 tons mined, and requires the operators to make quarterly returns of their products. The bill provides a method for taxing the business of coal mining, notwithstanding the adverse judicial decisions in reference to bills with similar intention.—*Baltimore Sun.*

Lindelof's American Patent Steam Road-Roller and Traction Engine.

THE Pioneer Iron Works of Brooklyn, whose advertisement will be found in another column, have, during the last few years, done quite an important foreign business, chiefly with Cuba, in the machinery used on sugar plantations.

These works have gained a high reputation as builders of Lindelof's Road-Roller and Traction Engine, which we illustrate above. Until, within about four years, we were dependent upon European makers for steam road-rollers, those constructed by AVELLING & PORTER, of England, being considered the best in use. The English machines proved unsatisfactory, however, in several important respects. They were exceedingly heavy and unwieldy, being constructed principally of cast iron, and the roller was of such small diameter that it sank deeply into soft ground, sand, or loose broken stone; indeed, it was requisite to prepare the surface of such material by means of a horse-roller before the steam-roller could be used at all.

Mr. LINDELOF bestowed much study upon the removal of these defects, and the result is seen in the American Patent Steam Road-Roller, which is confidently claimed to be superior to all other machines of the kind ever invented. During the past four years it has been thoroughly tested in the building of macadamized and asphalt roads in many of our principal cities, public parks, cemeteries, etc., and is pronounced by eminent engineers and practical mechanics the best road-roller ever built, either in Europe or the United States. The machine, as at present improved, is constructed almost entirely of wrought iron and steel. The frame consists of heavy wrought iron channel-beams, strongly braced with cross-beams of the same material and shape, tightly bolted and riveted. The small front rollers, as well as the large main rollers, are made of heavy wrought iron plates, with cast iron centers.



LINDELOF'S ROAD-ROLLER AND TRACTION ENGINE.

One very prominent advantage claimed for this, over any other road-roller is its capability of adjusting itself to any uneven surface, without straining the frame or injuring the engines. This important feature consists in the peculiar construction of the steering apparatus. At the front of the machine is a universal joint, in which the vertical pivot—corresponding to the king bolt in carriages—permits the axle to turn in steering the machine, while the horizontal pivot enables the front axle to assume a position at any required angle with the rear axle, thus preventing that twisting strain hitherto inseparable from the construction and operation of machines of this description.

There are several other advantageous features in its construction ; the means of transferring the propelling-power surpasses that of other machines, there being two high-pressure reversible engines, with link-motion. The connecting rods are attached to a heavy double-crank shaft which is held in place by suitable bearings, and on this shaft is keyed a steel bevel pinion. The large bevel-wheel, constructed of steel segments, is bolted to the wrought iron head of the large drum. This mode of transmitting power is clearly in accordance with the most approved modern practice.

The boiler is built of the best materials, stands in a vertical position, is easily accessible for cleaning tubes, hauling fires, etc. A direct-acting steam pump supplies the boiler with water from a large tank fastened to the frame work. The machine is constructed throughout in the most substantial manner, of the very best materials, and the workmanship is of the best description. The manufacturers guarantee to keep the roller in repair for one year, making good any breakage or wear that may result from defective material or inferior workmanship, but as yet they have never been called upon to replace a single broken piece.

The practical value of these road-rollers is fully established, and has been certified to by many engineers who have used them. We quote a single certificate from the well-known civil engineer Mr. C. C. MARTIN—no better opinion could be cited :

OFFICE OF THE NEW YORK BRIDGE CO., 21 WATER STREET, BROOKLYN, June 7, 1875.
PIONEER IRON WORKS :

Gentlemen—As Chief Engineer of the Prospect Park it was my privilege and duty to use the first AVELLING & PORTER Steam Road-Roller used in this country, and I have had occasion to recommend it for its efficiency and great economy over road-rolling by horse-power.

Since that time I have seen in use and carefully examined two of the A. LINDELOF Steam Road-Rollers built by you, and I have no hesitation in saying that the one which you recently built for Greenwood Cemetery, and which is now at work there, is the best steam road-roller that I have seen, and is especially adapted for uneven surfaces, steep grades, or crooked roads or drives. The one at the Cemetery goes up their steepest grades and around their sharpest curves without difficulty, and the construction is such that the machinery is not strained nor injured by uneven ground.

I take pleasure in recommending it as a first-class machine. Very truly yours,
C. C. MARTIN, 1st Ass't. Engineer, N. Y. Bridge Co.

On the Use of Pulverized Fuel.

Written for the ENGINEERING AND MINING JOURNAL.

By Chief Engineer B. F. ISHERWOOD, U. S. Navy.

EXPERIMENTS MADE AT SOUTH BOSTON, MASSACHUSETTS, TO DETERMINE THE ECONOMIC VALUE OF MESSRS. WHELPLEY & STORER'S PROCESS OF BURNING PULVERIZED COAL, MIXED WITH AIR AND FED BY A BLAST TO THE FURNACE ABOVE A BED OF INCANDESCENT LUMP COAL, COMPARATIVELY WITH BURNING LUMP COAL ALONE ON THE GRATES IN THE USUAL MANNER FOR THE GENERATION OF STEAM IN BOILERS.

CONTINUED FROM PAGE 58.

ECONOMIC EFFICIENCY OF ANTHRACITE BURNED IN THE PULVERIZED STATE.

It was impossible to determine by direct experiment the economic vaporization of anthracite burned in the pulverized state alone, but the experiments furnish the necessary data for an indirect determination. For this purpose two experiments must be selected in which the rate of combustion was about the same, and in one of which lump anthracite alone was consumed, while in the other, anthracite partly in the lump and partly in the pulverized state, was consumed ; then, by calculating the quantity of water which the combustible portion of the lump anthracite in the latter experiment would vaporize on the supposition that each pound of that combustible vaporized the same weight of water from the same temperature, and under the same pressure as in the former experiment, where the combustion was of lumps alone, and deducting this vaporization from the total vaporization in pounds found in the latter experiment, the remainder would be the vaporization due to the combustible portion of the anthracite burned in the pulverized state alone. The division of this vaporization by the weight in pounds of that combustible portion, would give the economic vaporization in pounds of water of the pound of pulverized combustible burned alone, under the same conditions of temperature and pressure for the water as in the case of the combustible portion of the lump anthracite burned alone.

The determination will be first made for experiments A and D, in the former of which lump anthracite alone was burned at the rate of 10.228 pounds of its combustible portion per hour per square foot of grate surface, while in the latter of which both lump and pulverized anthracite were burned at the rate of 10.167 pounds of their combustible portion per hour per square foot of grate surface, or almost exactly the same as in experiment A (line 16 of the table).

Now, in experiment D there were consumed 5,271 pounds of lump anthracite (line 5 of the table) having 15.17 per centum of refuse (line 10 of the table) which, being deducted, leaves 4471.3893 pounds of lump combustible, and assuming its vaporization to be the same as in experiment A, namely, 8.654 pounds of water from the temperature of 212 degrees Fahrenheit, and under the atmospheric pressure (line 35 of the table), there would be vaporized by the 4471.3893 pounds of combustible 38695.403 pounds of water, which, being deducted from the 49394.105 pounds of water vaporized from the temperature of 212 degrees Fahrenheit, and under the atmospheric pressure in experiment D (line 31 of the table), leaves 10698.702 pounds of water vaporized under these conditions by the combustible portion of the pulverized anthracite. As the weight of pulverized anthracite burned in experiment D was 2,495 pounds, and as it had 15.17 per centum of refuse, the weight of pulverized combustible consumed was 2116.5085 pounds, which, divided into the 10698.702 pounds, gives 5.055 pounds of water vaporized from the temperature of 212 degrees Fahrenheit, and under the atmospheric pressure by the pound of the combustible portion of pulverized anthracite. This economic vaporization is $\frac{8.654-5.055\times100}{8.654}$ =41.59 per centum less than that of the pound of the combustible portion of lump anthracite burned alone.

Again, making the determination for experiments B and E, in the former of which lump anthracite alone was burned at the rate of 13.284 pounds of its combustible portion per hour per square foot of grate surface, while in the latter of which both lump and pulverized anthracite were burned at the rate of 13.756 pounds of their combustible portion per hour per square foot of grate-surface, or almost the same as in experiment B. Now in experiment E there were consumed 6,943 pounds of lump anthracite, having 13.98 per centum of refuse, which, being deducted, leaves 5972.3686 pounds of lump combustible, and assuming its vaporization to be the same as in experiment B, namely, 7.673 pounds of water from the temperature of 212 degrees Fahrenheit, and under the atmospheric pressure, there would be vaporized by the 5972.3686 pounds of combustible 45825.984 pounds of water, which, being deducted from the 64234.616 pounds of water vaporized from the temperature of 212 degrees Fahrenheit and under the atmospheric pressure in experiment E, leaves 18408.632 pounds of water vaporized under these conditions by the combustible portion of the pulverized anthracite. As the weight of pulverized anthracite burned in experiment E was 3,420 pounds, and as it had 13.98 per centum of refuse, the weight of pulverized combustible consumed was 2941.884 pounds, which, divided into the 18408.632 pounds, gives 6,257 pounds of water vaporized from the temperature of 212 degrees Fahrenheit, and under the atmospheric pressure by the pound of the combustible portion of pulverized anthracite. This economic vaporization is $\frac{7.673-6.257\times100}{7.673}$ = 18.45 per centum less than that of the pound of the combustible portion of lump anthracite burned alone.

The mean of the two determinations shows that pulverized anthracite burned under the experimental conditions, is $\frac{41.59+18.45}{2}$=30.02 per centum less economically efficient than lump anthracite for the generation of steam in boilers. The very considerable discrepancy between the two determinations, is doubtless due to the disproportionally large quantity of air blown into the furnace with the pulverized anthracite during the experiment with slow combustion than during the one with maximum combustion, as the blowers (line 18 of the table) made fewer revolutions per minute during the latter than during the former.

ECONOMIC EFFICIENCY OF SEMI-BITUMINOUS COAL BURNED IN THE PULVERIZED STATE.

Making the determination for the economic efficiency of semi-bituminous coal burned in the pulverized state alone, in the same manner as for anthracite, and selecting, first, experiment F and the mean of experiments H and I, in the former of which lump semi-bituminous coal alone was burned at the rate of 10.286 pounds of its combustible portion per hour per square foot of grate-surface, while in the two latter of which both lump and pulverized semi-bituminous coal were burned at the mean rate of $\frac{10.921+11.066}{2}$=10.993 pounds of their combustible portion per hour per square foot of grate-surface, or nearly the same as in experiment F.

Now, in experiments H and I, there were consumed, respectively, 2,688 pounds of lump semi-bituminous coal, having 9.00 per centum refuse, and 3,136 pounds having 8.53 per centum refuse. The refuse in these two experiments being deducted, there remains an aggregate of 5314.5792 pounds of lump combustible, and assuming its vaporization to be the same as in experiment F, namely, 9.857 pounds of water from the temperature of 212 degrees Fahrenheit and under the atmospheric pressure, there would be vaporized by the 5314.5792 pounds of combustible 52385.807 pounds of water, which being deducted from the 63311.752+75418.616=138730.368 pounds of water vaporized from the temperature of 212 degrees Fahrenheit and under the atmospheric pressure in experiments H and I, leaves 86344.561 pounds of water vaporized under these conditions by the combustible portion of the pulverized semi-bituminous coal. As the weights of pulverized semi-bituminous coal, burned in experiments H and I, were, respectively, 4,116 pounds, with 9.00 per centum refuse, and 4,704 pounds with 8.53 per centum refuse, the aggregate weight of pulverized combustible consumed in the two experiments was 8048.3088 pounds which divided into the 86344.561 pounds, gives 10.728 pounds of water vaporized from the temperature of 212 degrees Fahrenheit and under the atmospheric pressure by the pound of the combustible portion of semi-bituminous coal. This economic vaporization is $\frac{10.728-9.857\times100}{9.857}$=8.84 per centum more than that of the pound of the combustible portion of lump semi-bituminous coal burned alone.

Again, making the determination for experiments G and J, in the former of which lump semi-bituminous coal alone was burned at the rate of 13.234 pounds of its combustible portion per hour per square foot of grate-surface, while in the latter of which both lump and pulverized semi-bituminous coal were burned at the rate of 14.855 pounds of their combustible portion per hour per square foot of grate-surface, or a reasonably near approach to the rate in experiment G. Now, in experiment J, there were consumed 3,975 pounds of lump anthracite having 7.00 per centum of refuse, which being deducted leaves 3696.75 pounds of lump combustible. and assuming its vaporization to be the same as in experiment G, namely, 9.530 pounds of water from the temperature of 212 degrees Fahrenheit and under the atmospheric pressure, there would be vaporized by the 3696.75 pounds of combustible 35230.027 pounds of water, which, being deducted from the 84280.195 pounds of water, vaporized from the temperature of 212 degrees Fahrenheit and under the atmospheric pressure in experiment J leaves 49050.168 pounds of water vaporized under these conditions by the combustible portion of the pulverized semi-bituminous coal. As the weight of pulverized semi-bituminous coal burned in experiment J was 6,375 pounds, and as it had 7.00 per centum of refuse, the weight of pulverized combustible consumed was 5928.75 pounds, which divided into the 49050.168 pounds, gives 8.273 pounds of water vaporized from the temperature of 212 degrees Fahrenheit and under the atmospheric pressure by the pound of the combustible portion of pulverized semi-bituminous coal. This economic vaporization is $\frac{9.530-8.273\times100}{9.530}$=13.19 per centum less than that of the pound of the combustible portion of lump semi-bituminous coal burned alone.

The mean of these two determinations shows that pulverized semi-bituminous coal burned under the experimental conditions, is $\frac{13.19-8.84}{2}$=2.17 per centum less economically efficient than lump semi-bituminous coal for the generation of steam in boilers. The considerable discrepancy between the two determinations is, doubtless, due to the disproportionally large quantity of air blown into the furnace during experiments H and I comparably with the quantity blown into the furnace during experiments G and J.

TO BE CONCLUDED.

English Iron Works.

NORTH STAFFORDSHIRE DISTRICT.

Special Correspondence of the ENGINEERING AND MINING JOURNAL.

BIRMINGHAM, England.

ABOUT fifteen miles southeast of Crewe is situated the town of Stoke-on-Trent, the center of the North Staffordshire iron district. Within a radius of six miles of that place there are thirty-five blast furnaces belonging to different companies, the principal ones being those of Lord GRANVILLE at Etruria, the Ravensdale Iron Works of R. HEATH & SONS, and the Chatterly Iron Company.

The works belonging to Lord GRANVILLE comprise eight blast furnaces, a large puddle mill and a number of smaller establishments for making bar iron. Four of the blast furnaces were built about 1837, and serve as types of most of the older furnaces in the district. Their exteriors are built in the cupola form with casing of boiler iron. Their height is 45 feet, and their diameter at the boshes 14 feet. Six tuyeres are used to each furnace, the blast being forced in at a pressure of from 2¼ to 3 lb. per square inch. Its temperature is raised to 675° to 700° Fah. in pistol pipe stoves. All of these furnaces are open topped, two of them, however, being provided with flues to take off a portion of the gases. The coal found in this locality is so rich in sulphur that it is generally necessary to mix it with a small proportion of Durham coke for use in the furnaces. Although of a dry and non-coking nature, a part of the coal is also coked in open heaps for the purpose of getting rid of some of the sulphur.

The appearance of this coke is but slightly different from its natural one as coal, so little loss of volatile matter is experienced in this process.

The amount of fuel now used in these furnaces per ton of No. 4 iron made is 29 cwt. of raw coal and 9 cwt. of coke.

In this district a variety of bituminous carbonate of iron much like the black band of Scotland is found and mixed in the coal measures. It has the local name of "Pottery Mine." The following analysis made by HERAPATH will give an idea of its nature :

CONSTITUENTS.	
FeO	42.25
$F_2 S_2$	3.53
Mn O	7.48
$Si O_2$	2.20
$Al_2 O_3$	0.50
Ca O	4.09
Mg O	2.60
Bituminous matter, carbonic acid, water and loss	37.35
	100 00

After calcination, the state into which it is brought before being used in the furnaces, it has the metallic semi-fused appearance peculiar to the purer Scotch black bands when burned. The usual furnace burdens at these works is made up of a mixture of from ⅔ to ¾ of this pottery mine with mill cinder and a very silicious brown hematite mined in Northamptonshire.

The analysis given below is the average result of three samples of this class of ores, and was made by BERNAYS :

CONSTITUENTS.	
$Fe_2 O_3$	56.53
$Si O_2$	22.20
$Al_2 O_3$	6.91
$H_2 O$	12.16
Unestimated matter	2.20
	100 00

These Northamptonshire ores, when first discovered, were considered valueless, but it was found that the deposits, which are very large, were quite variable in the quantity of iron which they contain, and of late years their use has become quite general in Central England and Wales.

About 7 cwt. of limestone per ton of iron made is used in the Etruria furnaces in making No. 4 iron. The slag which results from this mixture is peculiar in one respect, that of being as light in color as that which is made usually in afurnace working on high grade No. 1 iron. This peculiarity of the slag is generally noticeable in this district. The weekly yield of these furnaces is about 170 tons. The usual length of a campaign varies from six to seven years. Heavy sandstone blocks are used for the hearth bottoms. The four other furnaces belonging to Earl GRANVILLE were constructed in 1854. They are 60 feet high and 15 feet at the top of the boshes. Three of them have closed tops and the consumption of fuel is less by about 4 cwt. of coke per ton of iron than that in the smaller furnaces. They are provided with much better blowing apparatus, and make about 300 tons of iron per week. The puddling mill near these furnaces is arranged in a peculiar manner.

The puddling furnaces are built on a semi-circle, the shingling hammers and roughing down trains being placed near the center. The whole arrangement looks as though it were more the result of an effort for originality than real utility.

The works of ROBERT HEATH & SONS include several blast-furnaces which do not differ essentially from those just described.

For making refined iron this company has for some time been using the DANKS' rotary furnaces, and here more than at Middlesborough this process seems to be in a favorable condition.

There are ten furnaces in all, which work blooms of about 10 cwt. at a heat.

In one respect the practice is quite different there from the general one, and that is, in keeping the casing of the furnaces wet with dripping water. This does not, however, seem to entirely prevent the cracking and twisting of the cast iron work from variation in temperature.

Some improvement too, has been made in the very faulty mechanical arrangements of the original machine. Here, as at every other place where mechanical rotary puddling has been tried, the testimony is strongly in favor of the high and uniform quality of the iron produced.

Adjoining these works is the establishment of the Chatterly Iron Co. There are three open-topped blast furnaces at this place. They all have a uniform height of 55 feet and vary from 13 to 16 feet in diameter at the top of the boshes. The engine used to blow these furnaces is the finest in the district. It was built by ADAMSON, and is of the upright English type, where the blowing tub is below the steam cylinder. The standards on which the blowing tub rests are so constituted that the bottom head can be taken off, so as to allow of the removal of the piston from below. The diameter of the blowing cylinder is 100 inches, that of the steam cylinder being 48 and the length of stroke 5 feet. It is made so as to run at high speeds if necessary.

In a former letter on the manufacture of refined iron at Bowling and Low Moor, mention was made of some cold blast pig, which the company at the latter place buy from outside sources and use in the same manner as that of their own fabrication. This iron is nearly all fabricated in the north central portion of Shropshire, from materials which occur in the same or nearly the same geological position as those which produce the fine pig iron at Low Moor. The deposits, so far as known, both of ore and coal, are quite limited, so that in not more than 20 to 30 years the supply will probably be exhausted. The principal owners and workers of these choice deposits of coal are the Lillieshall Furnace Co., and the Maidley Court Iron Co.

A portion of the furnaces belonging to the former company, are well known to the readers of Mr. I. L. BELL'S work on the "Blast Furnace," in which they are cited as examples of this theory, concerning the efficiency of the hot blast. These furnaces, five in number, are in many respects examples of the best mechanical construction of the day. They are built in line, and closely adjoining a side hill which reaches nearly to the height of the furnace tops. The bases of the stacks are built of cut stone, and are carefully braced to stand vertical and lateral pressures. The casing of the furnace is made of ordinary red brick, hooped with horizontal band of flat iron. The total height from hearth to throat is 70 feet.

The shape of the interior of the furnaces, is that of two truncated cones, having a common larger base. One of the furnaces which thus far has given the best results, has the following dimensions : Diameter at bottom of hearth, 5 feet, which regularly increases up to the top of the boshes to 17 feet. This point is 24 feet above the hearth. From the boshes to the throat a distance of 46 feet, the diameter regularly decreases to 10 feet. The height of the lowest point of the tuyere arches, is 2½ feet above the hearth.

In one respect the economical working of these furnaces is a proof of the theory of Mr. F. BUTTENBACH, that thin walls, instead of wasting heat which should be utilized, produce instead an increased saving of fuel, for the total thickness of casing and lining at the boshes is only 22 inches, which is tapered down to 18 inches at the top.

The furnaces are blown with three tuyeres, the pressure of the blast being 3 pounds to the square inch. The furnaces are all open-topped, the escaping gases, which are hardly inflammable, attesting to their good working. Two fine beam engines supply the blast necessary for all five furnaces. Earl GRANVILLE, the principal owner in the company, does not seem to be capable of appreciating a fine piece of machinery, for he has had the motto in Latin, "More useful than ornamental" affixed to these engines. To raise the furnace charges to the level of the throats, two pneumatic cistern hoists are used, which, although working slowly, are very simple in construction and cheap to operate.

As all these furnaces are blown with perfectly cold blast, no heating stoves are used. The campaign of these high furnaces generally lasts from six to seven years. The furnaces, which formerly occupied the same sites, were built on the narrow hearth and flat bosh principle, which is still adhered to in most of the charcoal furnaces of the present day. The fear that any change in the shapes of the furnaces would effect the quality of the iron, was a long while in being allayed, and in the meantime the precious coal was being rapidly used up. It was also feared that the weight of the mass in a high furnace would crush the materials in an unprotected hearth, so as to prevent its proper working.

Fortunately the essay was made and it proved a success. The coal used, is coked in the same way as is practiced at the Bowling Works ; equal quantities of open and kiln coke being used in the furnaces. The average amount used to make No. 2 and 3 iron, is 27 cwt. to a ton. The ore is a nodular clayband, and is partially burned in open heaps and partially in Ejero kilns, braise being used for its combustion. The same care in the selection of limestone is noticeable here, as in the cold-blast furnaces of Yorkshire, this mineral being brought from Llanynech in North Wales. Fourteen cwt. of this per ton of iron is used. About 48 cwt. of the calcined ore is required to make a ton of iron.

Like the furnace practice in the Cleveland district, the cinder is kept running constantly, but from a fore hearth of the ordinary construction.

The weekly production of the furnaces is about 150 tons each. As the price which this iron commands is more than twice as great as that of the ordinary hot blast irons of the district, its use is confined almost entirely to the manufacture of wire, tinning plates and flange iron for boiler making.

The Maidley Court furnaces lie about six miles south of those of the Lillieshall Co. They are three in number, 60 feet high and 13½ feet in diameter at the boshes. The coal and ore which is used in them is of the same excellent quality as that possessed by the Lillieshall Co., and the iron produced is thought to be as good. Unlike the practice at the last mentioned works, the fuel is not all coked before charging into the furnaces, one-fourth of raw coal being generally used. These furnaces are worked on a principle which will perhaps seem rather novel to those engaged in the manufacture of cold blast iron.

It consists of a combination of hot and cold blast for each furnace. Two of the tuyeres which are placed at the sides of the furnaces, are supplied with cold blast, while the one at the back is placed six inches higher ; the blast for it being heated to 700° F. The theory of the manager Mr. PIERCE, to whom this arrangement is due, is that the heated air supplied by the upper tuyeres effects a considerable saving of fuel without affecting the quality of the iron, while the two lower tuyeres bring it into that somewhat mysterious condition of superiority, which is produced by the use of cold blast.

Sound Waves and Safety Lamps.

TWENTY-TWO large explosions have taken place in English coal mines since the year 1866 ; among these, seventeen took place at the moment of the firing of a blast at a distance. GALLOWAY conceived from this the suspicion that a violent sound-wave might be capable of pushing the flame through the wire gauze of the safety lamp, and thus ignite the inflammable gas around. It was known that when explosive gases are drawn through a wire gauze with a velocity of ten to twelve feet per second, the flame penetrates and ignites them ; but it was not known that a sound-wave would do the same thing, and this is what GALLOWAY has proved by experiment. He placed a safety-lamp in an explosive mixture, and fired a pistol at a distance of twenty feet, or ignited a box filled with a mixture of coal-gas and oxygen ; in either case, a large flame was projected through the wire gauze out of the safety-lamp, and ignited the surrounding gas. He found no difference when the gas was separated from the air by means of a thin membrane, which would not permit air currents to pass, but only transmit the sound-wave. The experiment was varied by transmitting the sound-wave through a tube twenty feet long, and of which the axis was directed toward the safety-lamp ; closing this tube with an elastic membrane made no difference whatever. He therefore came to the conclusion that a blast in a coal mine may make all the safety-lamps useless, while it explains the fact that an explosion in one part of a mine is often immediately followed by another explosion at a distant point.—*The Laboratory.*

The National Surveys.

(Extracts from an article in the Galaxy.)

By CAPT. C. W. RAYMOND, U. S. Engineer.

BUT what is this Corps of Engineers, the members of which are supposed to be unprepared by "their education and duties as army officers . . . to compete with or furnish any valuable aid to those civilians in charge of these surveys, who have devoted years of patient study to geology and the cognate sciences?"*

As the law provides, this corps is composed of such graduates of the United States Military Academy at West Point as are recommended for it by the academic board of that institution. The cadets at West Point are, as is well known, appointed from all parts of the country, and pursue a course of four years' study. The instruction at the Academy is more rigorous than at any other institution in the country, and a failure satisfactorily to pass any one of the eight examinations required before graduation (each examination involving several branches) is followed by the dismissal of the student. At graduation the cadets are graded in accordance with their average merit in all the studies which they have pursued during the course, the greatest weight being given to studies of an analytical character. In time of peace from one to four are generally assigned to the Corps of Engineers, and these are invariably taken from the head of the class. So high is the standard, that in some years none are recommended. The classes, as they report at West Point, average from one hundred to one hundred and twenty-five members. This method, therefore, selects from that number the three or four who, after careful and thorough instruction and examination, extending through four years, are, in the opinion of a board of experienced instructors, best fitted for the duties of officers of Engineers. The remark concerning officers of the Corps, that they are "Academy-made, not God-made," is thus seen to be a very foolish one. It is one great function of the Academy to select from its students those who have the greatest natural ability, and there is no institution in the country where mental power is detected so quickly, so promptly advanced, and so highly rewarded.

The course in mathematics at the Academy includes algebra, geometry, plane and spherical trigonometry, descriptive geometry, surveying, shades, shadows and perspective, and the construction of maps, analytical geometry, and the differential and integral calculus. Considerable instruction is given in topographical drawing, and mineralogy and geology are also studied. There is a very rigorous course in analytical mechanics and astronomy. Of course, other and very important studies are pursued, but they need not be mentioned in this connection. The practical instruction, so far as it relates to the duties with which we are now concerned, consists in surveying, practical astronomy, and reconnaissance. The instruction in surveying is sufficient to give the student a good idea of the instruments used and their manipulation. The instruction in field astronomy, which has been very much extended of late years, consists not only in occasional explanation and practice in the permanent observatory, but also in very frequent practice with the sextant, and actual work in a perfectly appointed field observatory, with the very best and most modern instruments, following the methods of the Coast and Lake Surveys. The instruction in reconnaissance, which, likewise, has been recently much extended, includes considerable practical instruction in rapid map-making, both mounted and on foot. Whoever thinks that this course of instruction, carried out with a rigor and thoroughness which would be impracticable elsewhere, is insufficient to qualify the three or four best men in a large class to make surveys under the supervision of experienced directors, must believe with Professor WHITNEY that this work requires the highest amount of scientific knowledge, skill, and talent, and must also believe that there is a better way of gaining these qualities than the thorough training of selected men. In point of fact, we may remark in passing, the work referred to does not require the highest amount of either. The knowledge of mathematics demanded in the most elaborate methods of surveying is very limited; and the same is true of astronomy, so far as its connection with the determination of geographical position is concerned. The problems arising in this kind of work are not of the most difficult character. Compared with the course in analytical mechanics, the course in astronomy at West Point, although containing ten times as much as is required for astronomical field work, is regarded as very easy, and presents no difficulty whatever to the highest section of cadets. We can assure Professor WHITNEY that what he calls "the highest geodetic problem of the Coast Survey, that of working up the observations with a view to contributing to our knowledge of the form and size of the earth," receives the attention of the young gentlemen at West Point, and as an examination subject is not regarded with disfavor. As for the field work, there is no field instrument used in surveying or astronomy (the sextant excepted) that any man with reasonable natural aptitude and theoretical preparation cannot learn to use creditably, if not perfectly, in a week.

Thus far we have considered simply what the young Engineer officer brings with him in the way of education and ability when he enters his corps. It remains to be seen what he obtains there to fit him further for his work. On leaving the Academy he is almost invariably ordered to duty with the Engineer battalion at Willett's Point. Here there is established a field astronomical observatory, in which he is obliged to work at regular and frequent intervals under the supervision of older and more experienced officers. He makes his own observations, and computes his own results. The instruction includes almost every problem which occurs in astronomical field work. In addition to this, a great deal of practice in rapid and detailed map-making is obtained, and in this way many square miles have been mapped by the officers and sergeants of the battalion for the land defences of New York. After at least one year, and probably two or more, at Willett's Point, the Engineer officer usually goes to the Lake Survey, where he remains on duty for several years. The kind of work done on this survey is too well-known to require detailed mention here. It is sufficient to say that it is of the same character as that of the Coast Survey. This service we may regard as completing an officer's regular education for this kind of work. Perhaps it is not strange that a committee of Congress should say that such preparation is inadequate to qualify an officer "to compete with or furnish any valuable aid to those civilians . . . . who have devoted years of patient study to geology and the cognate sciences;" but when a professor in a great university gravely advances the same idea, we have a right to be astonished.

The facts we have adduced show conclusively that the Engineer officer of the present day, educated and trained under the present system, is quite competent to prosecute successfully surveys of the accurate kind—which require more time, more money, more practice, and less natural ability than any other kind of field work. But we have not intended to convey the idea that all officers of the corps have passed through exactly the course of instruction and selection which we have indicated. It is true that all are graduates of the Military Academy; but West Point has grown and developed just as other institutions throughout the country have done. The experience of all, however, has been largely what we have described; and the young men of the corps, upon whom this kind of work will devolve hereafter, will all have to undergo this or probably a still more extended course of instruction.

So much for the *à priori* argument; but have the Engineers ever shown by actual execution their competency for the most accurate kind of geodetic work? Undoubtedly. The amount and character of their labors on the Coast and Lake Surveys, and on our international boundary surveys, furnish ample evidence of this. We have no objection to make to the praises which Professor WHITNEY bestows upon the Coast Survey; they are well deserved, and we cordially endorse them all. He does not seem to think it necessary, however, that the Coast Survey should lose the credit of what the army has done for it, although he is very careful to insist that the Engineer Bureau shall not claim the credit of the labors of its civilian employees. He eulogizes BACHE as the great organizer and director of the survey, but omits to say that BACHE was a West Point honor-man, and some time previous to his taking charge of it, an officer of the Corps of Engineers. HASSLER, who inaugurated the survey, resigned his professorship at West Point to undertake that work. About forty officers, graduates of West Point, have been employed upon the survey; and of these a very large proportion have been officers of Engineers. These officers were often employed upon the most scientific duties of the survey. They labored in the field astronomy, the primary triangulation, the secondary triangulation, the topography, the hydrography—in fact in every department of the survey. An officer of Engineers always had charge of the office until the beginning of the war. In every department in which they have worked they have produced satisfactory results and received praise. It would be impossible to note in detail what the Survey owes to the army, without careful examination of its reports. But a few instances will suffice. In addition to the services of HASSLER and BACHE, which West Point can fairly claim, we have the invention of the zenith telescope and the American method of determining latitude, by Capt. TALCOTT of the Corps of Engineers. The polyconic method of projecting maps, now used in the Coast Survey, was introduced by an officer of the Corps of Engineers.* The oldest, most experienced, and most distinguished observers still connected with the survey were directly educated by officers of the Corps of Engineers. The field manual used on the survey for years, and still used to some extent, was prepared by an officer of the Corps of Engineers.

The survey of the Northern lakes, which is under the control of the Engineer Bureau, most of the work being executed by officers of the Corps, presents the strongest evidence of the competency of these officers to do first-class work. The methods followed and the results obtained in this survey are, in most respects, identical, and, in every respect, equal in accuracy, with those of the Coast Survey. On this survey over thirty officers of the Corps have, from time to time, been employed.

The international boundary surveys, which have been executed under the direction of officers of Engineers, have been models of accurate work. More than thirty officers have been employed on these surveys.

There are many other instances of accurate surveys made by the Engineers, which we might mention; for instance, GRAHAM'S celebrated survey of Cape Cod, and the thousand and one surveys of sites for fortifications which have been made with foot, and sometimes even six-inch, contours. But it is not necessary to go beyond those already mentioned, the character of which is beyond suspicion or dispute. At least, one-third of the Corps, as it now exists, have served on these very duties.

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As the next step in our examination of the main question, we must call attention to one or two points in connection with the organization of the Engineer Bureau. It is true that the size of the *Corps* of Engineers is incommensurate with the duties which it has to perform; and this has been used as an argument why the work of the surveys ought not to be put upon it. But the Engineer *Bureau* is quite a different matter. From its first organization until the present day, the employees of the Bureau have been officers *and civilians*. The civilians form just as much a part of the system as the officers. From the time of NICOLLET'S employment to that of Mr. CLARENCE KING, it has been the custom of the Bureau to employ civilians, often in charge of surveys and other works, and often in much more important positions and at much higher salaries than those of most officers of the Corps. This custom has become so thoroughly established that there has never been any ill-feeling on the part of officers concerning it. The nature of the position occupied by a thoroughly accomplished scientific gentleman under the Bureau might be easily ascertained from Mr. CLARENCE KING; and we are quite willing to ask him what are his relations with officers of the Corps of Engineers, and whether he has been made to suffer for want of a commission. The Engineer Bureau has a perfect right to all credit arising from the labor of its civilian employees; and we see no reason why civilians should not be employed under this bureau as well as under any other department of the Government. The attempt of Professor WHITNEY and others to divide the Bureau into two parties, military and civilian, and set one against the other, speaks for itself; and his comparison of the survey of an Engineer officer, made with instructions to cover a large extent of ground at small expense, with the limited and expensive survey of KING, much to the disparagement of the former, but without any intimation of the essential difference of the two works, needs no characterization. We admire and appreciate Mr. KING'S beautiful work as much as any one can; but the Bureau could not cover the whole country with such a survey if it would, and would not if it could. The expenditure necessary for such a purpose would not bring commensurate returns, and would be a wrong on the people.

Finally, we must call attention to the fact that the Chief of Engineers is by law chosen from among the officers of the Corps of Engineers, and is always an officer of great experience and high reputation in the Corps.

Having thus briefly considered the character and fitness of the Engineer Bu-

* We quote from a report to Congress, April 28, 1874, by the Committee on Military Affairs, with reference to a bill permitting the detail of officers as principal aids or assistants on surveys undertaken by the several States.

* Concerning the officer who superintended this organization, Professor BACHE makes the following remarks in the Coast Survey Report for the year 1853:

"This officer was placed in charge when the augmentation of the scale of the Coast Survey was begun, and devoted himself, with untiring assiduity and most remarkable success, to the difficult task imposed upon him. His health suffered so seriously from the accumulated labors which he undertook, that he was finally obliged to leave the work. His services were so fully shown by the condition to which he had brought the office during his charge of it, that I simply discharged a duty in recommending him for a brevet on retiring. The varied and complicated duties of the several departments of office work require not only professional knowledge of a high order, but intense application, and very considerable administrative power."

reau in its relations to the surveys of the country, let us now turn our attention to the organization which it has been proposed to substitute in the prosecution of this work. If the surveys are not to be conducted under the supervision of the Engineer Bureau, they must be placed in the hands of some other organization under some other department of the Government There are now three such organizations in existence; viz.: the Coast Survey, under the Treasury Department; the survey of Dr. HAYDEN, under the Department of the Interior; and the survey of Major POWELL, under the same department. As for the Coast Survey, it has never been proposed to place the general surveys of the country under its control; but we shall, nevertheless, have a few words to say about that organization further on. The two others are very similar in character and purpose; we shall, however, comment only on the survey of Dr. F. V. HAYDEN, because we regard it as a characteristic example of what our surveys will become, and how they will be conducted, should they be taken from the control of the Engineer Bureau and placed under the direction of some other department of the Government. This survey seems to present all the excellences and all the defects of the system which many are anxious to introduce; and, moreover, it is this particular organization, coming into the field backed by several scientific schools of high repute, which has proclaimed its intention of taking the surveys from the hands of the Engineers. The fight which has been made has been determined and unscrupulous; and we may rest assured that if a substitute is to be found for the Engineer Bureau in the surveys of the country, this is to be the substitute.

Dr. F. V. HAYDEN, the gentleman in charge of this survey, seems to have had considerable experience as a scientific collector for various institutions. He was at one time surgeon and naturalist to one of the expeditions of WARREN, of the Engineers. Then he was a surgeon of volunteers during the war; and then, to use his own frank words, the close of the war having left him without occupation, he commenced again the business of collecting, and finally, "after a painful struggle," and from small beginnings, he succeeded in organizing and perfecting the survey of which he is the head, as it now exists. Concerning Dr. HAYDEN'S personal fitness for the position which he occupies it is unnecessary to speak. It is only fair to say, however, that he is, like Professor WHITNEY, a member of the National Academy, and as his survey seems to be indorsed by several of the leading scientific institutions of the country, we presume he fitly represents the gentlemen who are engaged in natural science throughout the land. The money for Dr. HAYDEN'S survey is appropriated yearly on the estimates made by him. The plan of the work is arranged by Dr. HAYDEN; the assistants are engaged, their salaries determined, their promotions made—all by Dr. HAYDEN. This is, of course, subject to the approval of the Secretary of the Interior—the only check, so far as we can learn, on the whole system.

Now what advantages are claimed for this system over that so long in use? First, in the words of Dr. HAYDEN, "much greater efficiency has always been gained where the leader of the party is himself an ardent worker in geology and science generally, as he is better able to judge of the work to be performed, and as he urges forward all his scientific assistants by the force of example and enthusiasm." This may be all very true as far as geology is concerned, and if geological research be the most important part of a survey, as naturally enough it may appear from Dr. HAYDEN'S standpoint, this argument might be worth consideration; but it seems scarcely necessary to prove that the geographical and geodetic work is the most important, and must be the basis of all surveys. When it is considered that this work requires the expenditure of an amount of money and labor vastly in excess of that needed for all the other operations of a survey, our statement cannot be questioned. We might as well place a painter in charge of the construction of a building, on the ground that the architect is not a practical colorist, as to place a geologist in charge of a great survey because the topographer does not happen to be an expert in this secondary work. The argument, therefore, which requires the director of a survey to be a capable geologist demands in a much greater degree that he should be a trained topographer and surveyor. This Dr. HAYDEN cannot pretend to be; and he does not hesitate to employ a topographer to take the entire charge of his geographical work. But granting, for the sake of argument, that the director of a great survey should be a geologist, surely the Engineer Bureau is quite as competent as any other department of the Government to engage civilians to take charge of surveys, when it is judged necessary and proper to do so. This has, in fact, been done repeatedly—the chief difference between the Engineer Bureau and other departments being that its requirements include, for the *head* of a survey, at least a moderate acquaintance with geodetic and astronomical methods. This may exclude from commanding positions in such work a large class of enthusiastic scientists; but it has not excluded them, and will not exclude them, from employment under the Bureau exactly in accordance with their special capacity.

But let us compare the systems themselves, and inquire which of the two is likely to furnish the best method of selecting the immediate director of a great survey.

In the case of the Engineer Bureau the selection is made by the Chief of Engineers, an experienced and distinguished officer, who has devoted his life to this and other scientific work, and who can have no motive in the selection but the interests of the Government. He is restrained from favoritism by the most solemn traditions of his corps. He is selected from a body of gentlemen who have been thoroughly trained for the duty, and who have themselves been chosen, after long and careful examination, by a board of experts at the Military Academy, against whom no one has been so foolish as to charge a shadow of favoritism. In special cases he has the power to employ civilians on Government duty, and from the organization of the Corps to this day the exercise of this power has been pure.

In the second case the selection is made by the Secretary of the Interior, who, it is quite possible, might not have the experience or ability for this purpose possessed by the Chief of Engineers; who would be more liable to be deceived by charlatans; and who might, in some future epoch more venal than our own, be moved by political pressure to appoint some person not well fitted for such a position. Gentlemen less suitable than Dr. HAYDEN, finding themselves without occupation, might be too strongly pressed to painful struggles after positions under the Government; and we are justified in believing that their chances would be somewhat better under the Department of the Interior than under the Engineer Bureau.

* * * * * * * *

We next have to inquire which method of selection best insures integrity and economy in the disbursement of Government funds. The officers of the Engineers hold life commissions, which cannot be taken away from them except in case of bad behavior, and would surely be taken from them for dishonest conduct. Their *esprit du corps* is greater than that of any other organization in the country. The ideas of the Corps with respect to the use of Government money are much stricter, and the system of checks is much more rigorous, than in any other department of which we have information. Every expenditure, no matter how small the amount, is scrutinized by an officer of the Bureau, and must be approved by the chief of the Corps, before it goes for final examination to the auditors of the Treasury. Now who stands as a check between Dr. HAYDEN and the Secretary of the Interior? No one, so far as we can learn. The practical working of the Engineer system may be gathered from the fact that from the organization of the Corps to the present day, a period of about seventy years, no officer has ever been guilty of dishonesty. We doubt whether a similar statement can be made of any other department of the Government.

The strict notions of the Engineers with reference to Government money may be illustrated by one or two facts. The reader probably understands the general nature of a "deficiency bill." It is a bill appropriating money to carry on, during the current fiscal year, some work for which the appropriation made at the beginning of the year has proved insufficient. This insufficiency may be due to unexpected emergencies, such as the outbreak of war or the fear of it, or to incorrect estimates of probable expense submitted to Congress by the Executive Departments, or finally to the action of Congress, in appropriating less than is estimated. A few months later, circumstances being favorable, a deficiency bill may be invoked to remedy the economy of the preceding session. Now it is quite true that Congress often cuts down appropriations for special purposes so far as to injure the public service; and it is true that there are emergencies when the heads of the departments are justified in exceeding the limits thus prescribed. But as a rule this is not true of public buildings or surveys. If Congress reduces the appropriation for these, so that they cannot go on, they ought to stop. In no other way can responsibility be defined and enforced. And this is the immemorial practice of the Engineer Bureau. Its estimates for fortifications, surveys, etc., are submitted to Congress; whatever sums are appropriated it expends; and there it stops short, without complaining, or lobbying for a deficiency bill. Let the committees of both Houses say whether this is the case with private public surveys.

* * * * * * *

The engagement of ornamental young gentlemen as members of an expedition, to please their influential friends, is another form of this evil. We will not dwell on this point, though there is a good story afloat on the plains of the vigorous language employed by a certain distinguished director of a survey, when his mules were "stampeded" out of camp by Indian thieves, under the very nose of an amateur sentinel, who was laboriously employed in coloring a meerschaum.

We next ask, Which of these systems is best adapted to secure a trustworthy execution of the Government work? Of all branches of this work it must, on consideration, be admitted that the surveys of the national territory offer the greatest opportunities and the strongest temptations for misrepresention and deceit. By filling in the details of a map when they have not been obtained in actual field work, by magnifying the labor of the field parties, and by claiming a degree of accuracy which the character of the survey does not warrant, it is too easy to deceive those who are not thoroughly acquainted with the means and methods necessary for geodetic work. The temptation to make pretty maps on paper, to get up a great popular reputation, and to receive the approval of learned societies and the public press, and the ease with which all these things can be accomplished, are greater than in almost any other field of labor. In which of the two systems we are discussing are these evils best guarded against and least liable to occur?

An officer of the Corps of Engineers is assigned to this duty by the will of his chief. His position and salary do not depend upon his continuance in this particular duty. On the contrary, there are other duties, of more importance and dignity, to which he may be assigned. It is not his business to ask or work for appropriations, or to see that they are obtained. Selected for the duty solely on account of real or supposed fitness, his results are constantly scrutinized by experts thoroughly acquainted with the practical management of surveys, and his continuance in office depends on his ability, not to convince Congress of his fitness and efficiency, but to satisfy the expectations of his chief. Add to this that he has a reputation in his corps to win or lose, the foundations of which he has laid at the Academy, which it is the great object of his life to preserve and increase (since he cannot expect popular recognition or applause), to which a suspicion of misrepresentation would be absolutely fatal—and the system of checks on these evils seems about as complete as can well be devised.

How is it with the other system of conducting surveys, in this respect? The appropriations are made yearly, and depend largely, if not altogether, on the personal exertions of the chief of the survey. His position and income hang directly upon his success in persuading Congress of the importance of his labors, the value of his results, and the skill and ability with which he has conducted his work. He is supervised by no expert. His influence is to be exerted wholly on people who, for the most part, are incompetent to judge of the value of his results, and at all events have no time or inclination to give his work thorough critical examination. He has no corps traditions, no previous hard-won reputation to hazard. He looks to find the reward of his labors in the continuance of his office, and in a great popular reputation. For his purposes, indeed, such a reputation is almost a necessity. Hence he is always seeking to make a display. He struggles painfully into national academies; his name and his deeds are continually appearing in the newspapers; his documents crowd the book-shelves of learned societies; he propitiates distinguished professors; he entertains influential scientists; he ingratiates himself with Congressional leaders. He has, in a word, every temptation in the world to be a humbug; and we cannot blame him much if he is one, for it is the system that has made him so. A man may have much ability, much energy and zeal, even a very considerable sense of personal dignity and honor, and not be able to resist such temptations as these.

We leave our readers to judge which of these two kinds of responsibility will be most effective—that of the officer of Engineers to the professional men placed over him, or this indefinite accountability to 'Congress and to "the scientific men of the country," as one of our scientists gravely puts it.

Finally, after what has been said, it is scarcely necessary to ask which of these systems insures the greatest skill and accuracy in the execution of the work and in the results obtained. It is amusing to note that Dr. HAYDEN has been obliged to go for most of his astronomical work to the Coast Survey, and to contemplate the exquisite simplicity with which he claims that his methods are much more nearly allied to those of the Coast Survey than to those of the Engineers; ignorant of the fact that exactly the same methods are being employed on the lake and boundary surveys, and that these methods were almost all either devised or introduced by officers of the Corps.

CHARLES W. RAYMOND.

CORRESPONDENCE.

KITTANING COAL COMPANY, No. 125 South Fourth Street,
PHILADELPHIA, January 24, 1876.

TO THE EDITOR: Sir—We notice in the article in your last issue, entitled "The Consolidation Coal Co. and its 'Freezing Out' Policy," one statement which we desire to correct, viz.: "In the Clearfield region, where the veins are much smaller, 45@50c. a ton is paid for mining and delivering the coal at the mouth of the drift," etc. This is incorrect in so far that the price paid the miner does *not* include the delivering the coal at the mouth of the drift, but the price paid for mining only includes the digging and loading on mine cars at the face of the work. The delivering is paid for separately and in addition.

You will oblige us by making correction in your next issue, Yours truly,

H. T. SHILLINGFORD, Secretary and Treasurer.

German Workmen.

A CORRESPONDENT of an English paper says: "Strikes found their way into the German colliery districts some eight or nine years ago, and began to revolutionize them as they have revolutionized England. What their effect ultimately will be one can hardly say yet, but it is obvious that they have rendered it possible for England to hold her place in the market much longer than she could otherwise have done. Had not wages been forced up in Germany, England would have been driven out of the competition altogether. So far, therefore, German strikes have benefited England, but I fancy no one can think of the state of trade either in Europe or America without deploring that most monstrous of all settlements of disputes in trade—a strike. Whatever advantages internecine struggles may have wrung from one side or the other, the method is an ugly one, and entails endless mischief. From one point of view, however, the strike became a necessity in the order of events. The paternal government had to cease, and make room for a new relationship between employer and employed. Working men had begun to think they had something to say in the settlement of wages and hours. The employers, of course, took umbrage at this, and resented it as the needless upsetting of a time-honored arrangement. The spirit of the employer has, perhaps, been nowhere better exemplified than in a speech delivered about three years ago to his workmen by the famous Mr. KRUPP, at Essen, at whose works, covering 450 acres of ground, 8,000 men are employed. "Forty-five years ago," he said, "when I stood on the foundations of these works, the daily wages of my small array of smiths and smelters was raised from 18 stüber to 7½ sgr. (9d.). The week's pay was 1½ thalers (4s. 6d.). During fifteen years I earned as much as proved sufficient for my living, and no more. As circumstances changed, and the works expanded, I gradually raised the rate of wages (as I am doing now) without compulsion or advice. Improvements have been made, and are still being made; my best efforts have been used in the interests of my men; thousands have been spent, and are still being spent, in lodgings. An honest and industrious mechanic in my establishment has the prospect of retiring, after a certain period, to his own cottage, where he may pass the rest of his days in the enjoyment of a moderate pension. I shall refuse every unjust demand, and I claim from every person who is dissatisfied that he shall give me instant notice if he wishes to forestall my giving notice to him, with the assurance that I mean to be master in my own house and on my own ground." Consul-General CROWE informs us that "no strike took place at KRUPP'S."

The Scotch Pig Iron Trade of 1875.

THE following is from the annual review of Messrs. JOHN F. SWAN & BROTHERS, Limited, Glasgow:

PRODUCTION.—The make this year was 1,050,000 tons as against 806,000 tons in 1874, or an increase of 244,000 tons. This is almost entirely attributable to the working man having had the prudence to refrain from any general strikes, seeing that the current of trade would not justify any sustained upward movements in wages, and that nearly every employer of labor was losing money. Some isolated interruptions were reported, but these being easily adjusted proved only temporary. An attempt was made in the autumn to bring the men out by unsubstantial orations on the part of their leaders, but there was no response, and we have had a quiescent labor market coincident with reduced wages. It would, however, be erroneous to suppose that capital and labor have lost their unfortunate antagonism, as higher prices for Iron and Coal will certainly bring the question to the front as before. It seems now generally accepted that the old type of blast-furnace about 40 to 50 feet in height does not give the maximum results, and consequently there are several alterations going on whereby the furnaces are either heightened or built anew to about 75 feet, and at the same time the economizing and adaptation of the gas principle makes steady progress. These changes are expected to lead to an increased output shortly. It is but right to say that the utilization of the waste gases was tested about the year 1848 on the west coast of Scotland, but as coal is used here instead of coke, as in England, the reason of the failure of the system previously, was that the connecting tubes were not large enough, and hence explosions occurred. This has now been got over, and further improvements are only a question of time. There are at present 114 furnaces blowing, 10 repairing, 2 building, and 31 not working. The average number in operation since last Christmas was 117, producing about 173 tons per furnace per week.

CONSUMPTION.—Our local foundries have melted 12,000 tons more than in 1874, having been well employed throughout the year, especially as regards water pipes, railway chairs, and general castings; but those turning out machinery have had little to do owing to the flat state of shipbuilding on the Clyde. A very large quantity of Pig Iron is being used for the fronts and columns of buildings, and for rain-water and ornamental purposes great activity has been apparent. This latter department is engaging more special attention, and from its relative cost and neatness, iron is frequently preferred to any other material. The forges have again suffered from unremunerative prices, but despite the universal complaints they have used 31,000 tons more than last year, a result not quite consistent with the accounts of bad trade so current for months. There is a satisfactory amount of work arranged for in every department, and prices having recovered lately, more cheerfulness is observable on all sides. The total consumption this year exceeds that of 1874 by 43,000 tons, attesting the confidence of customers in the excellence of our local manufactures. A further increase of 20,000 tons in the importations of ordinary pig and hematite iron from England has to be noted, the total being 220,000 tons, against 200,000 tons in 1874, the largest return as yet recorded. The strongest point in the operations of the twelve months is, that this has all been absorbed in addition to 170,000 tons of the increased Scotch production, or an actual improvement of 190,000 tons in the yearly consumption. The deliveries by railway to England were 73,491 tons, against 50,093 tons in 1874, being 23,398 tons more, partially accounted for by the lower range of prices.

EXPORTS.—The shipments to foreign parts amount to 368,453 tons against 296,803 tons in 1874, showing an excess of 71,650 tons, and that in the face of a severe monetary crisis in Germany, which takes annually heavy quantities from this side. This item is the more remarkable, as commercial panics have been unusually rife in many parts of the world, America and Canada remaining dormant under exhaustion arising from overtrading. The deliveries coastwise were 174,056 tons against 166,104 tons last year, or 7,952 tons better; but a portion of this, being transhipped abroad from outports, comes also under the improvement to foreign countries. The stocks in Lancashire have been kept very low by our makers, so that the coastwise returns are comparatively small.

STOCKS.—The amount of iron in Messrs. CONNAL & Co.'s stores represented by warrants for 3-5 No. 1, and 2-5 No. 3, good merchantable brands, is now 63,299 tons against 33,875 tons at last Christmas, or 29,424 tons more. The makers have met every demand upon them for deliveries, with more ease than last year, as the furnaces have not been checked by labor complications, and there are 106,701 tons in their hands, as against 62,155 tons at last return, or 44,576 tons more, and the whole stocks are 170,000 tons against 96,000 tons last year, or an increase of only 74,000 tons in 1875. The greatest quantity ever actually in our storekeepers' yards was on 29th June, 1866, 539,234 tons, and the smallest on 23d October, 1874, 17,118 tons.

FLUCTUATIONS.—The highest figure reached this year for warrants was 77/ on 6th January, the lowest cash quotation was 57/6 on 10th June, and the average price was 65/9, as compared with 87/6 in 1874, being 21/9 per ton less. We have thus seen a fall from 145/3 on 27th February, 1873, to 57/6 on 10th June, 1875, or a decline of 87/9 per ton within twenty-eight months, showing a very abnormal state of matters. The variations in special brands this season were somewhat severe, particularly in No. 1 Coltness, this quality having been forced down by operators in the early months to about 62/6 per ton, and springing subsequently to 85/ per ton, since which there has been more steadiness arising from continental inquiries.

SHIPBUILDING. The discouraging rates of freight and reduced emigration caused several millions worth of tonnage to be laid up for some months, and it was not unusual to hear almost daily, of yards having launched their last vessel. But the recent enormous losses at sea and moderate prices asked by builders, have brought out numerous orders, and fair employment has been secured for the winter. During 1875, 263 vessels were launched, having a gross tonnage of 231,662, against 204 vessels in 1874, with a tonnage of 264,010, and there are at present 144 building, with a tonnage of 132,289.

The Coal Trade of 1875 at New Orleans.—Messrs. C. A. MILTENBERGER & Co., Coal Commission Merchants, No. 68 Camp street, New Orleans, La., beg leave to call your attention to the following Statement, showing the arrivals, consumption, etc., of Pittsburgh Coal, in the New Orleans market, for the year ending December 31st, 1875.

DATE.	Stock on Hand.		Arrivals.		Consumption.		Wholesale Prices.
	Boats.	Barges.	Boats.	Barges.	Boats.	Barges.	Per Bbl.
January 1st, 1875,	107	6	14	9	26	6	$ .45 to $ .40
February " "	108	18	20	19	19	7	.38 " .30
March " "	107	6	15	—	16	12	.30 " .32½
April " "	128	2	38	7	17	11	.32½ " .35
May " "	176	5	65	13	17	10	.32 " .35
June " "	175	4	30	1	31	2	.33¾ " .37½
July " "	165	3	7	—	17	1	.40 " .42½
August " "	155	3		—	10	—	.40 " .35
September " "	203	7	67	16	19	12	.32½ " .35
October " "	184	5	—	—	19	2	.35 " .37½
November " "	158	2	—	—	26	3	.37½ " .35
December " "	137	13	—	13	21	2	.35 " .32½
Total, 1875...			256	78	238	68	

N. B.—The arrivals, consumption, and price of coal given on the 1st of each month, are for the month previous, as for instance: that reported on January 1st, is the report for December, 1874, and so on throughout the statement.

The Coal sent to Planters below the city is included in the consumption, while that left on the coast above is not considered.

French Creeks are classed as barges, and hulls as boats.
Average contents, boats about 9,000 bbls. Barges 4,500 bbls.

Consumption,	1869,	3,317,000 bbls.	Consumption,	1873,	2,841,500 bbls.
"	1870,	3,203,500 "	"	1874,	2,749,500 "
"	1871,	3,112,000 "	"	1875,	2,448,000 "
"	1872,	2,991,500 "			

Utah Mining Interests.—During the six years since the first shipment of ores from Utah, the total products of ores and bullion are reported to amount to $26,000,000, and the present cash value of mines worked—in connection with the thirty smelters now in running order, the twelve-stamp mills, four concentrating works, and one separating and refining establishment, nearly all within a radius of sixty miles from Salt Lake City—cannot be less than $60,000 000. The mining interests of Utah were never so promising or so profitable as at present.

Reports from Utah say that the main shaft of the Emma Mine was stopped by the English company at a depth of less than four hundred feet, at which point the ore had become too narrow to pay to work. Since the suspension of operations a St. Louis organization known as the Bay City Tunnel Company had started a tunnel into the Emma Hill, and this tunnel, at a distance of 1,800 feet from its mouth, had cut a large body of rich talcose ore, carrying several thousand dollars per ton. This ore body is reported as in the correct position to be a continuation in depth of the Emma Mine, and its value is estimated at from $2,000,000 to $10,000,000. The Emma Company, however, will have no right in any part of this bonanza until it proves, by extending its shafts downward that the ore is within the walls of the Emma vein. In the meantime the Bay City Tunnel Company assumes the ore body to be a new vein, to which they are entitled by right of discovery, and they are taking out large amounts of ore It has for some months been the opinion of experts that the Emma mine is situated upon an immense ore channel four hundred feet in width, running the entire extent of the Cottonwood District and of infinite depth.—*Exchange.*

Our advices are very conflicting as to the value of the recent discoveries in the Bay City Tunnel, some going so far as to say that if rich ore has been found it must be stowed away in the drifts, for it has not come out of the tunnel. On the other hand, we have heard from parties who are interested in knowing that good ore has been found. We give the reports for what they are worth.—[ED. E. & M J.]

Omaha, Nebraska, Refining Works.—The Omaha Refining Works, which get the greater portion of their crude bullion from Utah, have done a very large business the past year. The *Republican* says: "The value of gold, silver and lead produced in 1875 is $3,600,521, which, with the value of anti-friction metal, makes the business of 1875 over *double* that of 1874. Considering the premium on gold, their business for 1875 is considerably over $4,000,000.

Iron and Carbon, Mechanically and Chemically Considered.

In view of the great importance of accurate knowledge respecting the chemistry of iron and steel, as related to their physical properties, I come before you with a paper showing the great mass of work which has been heretofore done on the subject. I have tabulated the more important data I bring at this time, so as to draw the results clearly out. This information is accessible to all who will seek for it. I have made it the basis of my own practice throughout, and such knowledge is undoubtedly the only foundation for successful practice of metallurgy.

You know that after 1841 the ordnance corps of our army made exhaustive experiments on the properties of cast iron. The investigations were undertaken in order to obtain necessary information on the reorganization of the corps.

I wish to call your attention to the results obtained by a comparison of the chemical and physical properties of cast iron for guns, to describe certain characteristic peculiarities of steel, and to give a brief history of the chemical work relating to carbon in iron.

The "Reports on Experiments on the Strength and other Properties of Metals for Cannon," published by H. CAREY BAIRD, Philadelphia, 1855, consists of reports by Major WADE, Lieut. HAGNER, Lieut. RODMAN, Capt. WALBACH, Major RAMSAY, and of Messrs. MORFIT and JAS. C. BOOTH. The cast iron guns in use up to 1840 were highly unreliable, many bursting in the proof or after a few rounds of service charges. But others endured 2,000 rounds or more, so that it became evident the fault lay not in the metal wholly but also in the skill of the iron-founders. The guns in service were classified and a stringent system instituted of inspection during manufacture. This work occupied the thirteen years between 1840 and 1853. The results, direct and indirect, were more than commensurate with the cost of the work. They suggested the change of form now adopted universally in our service and they put the methods of manufactures of cast iron on a rational practical basis. Lieut. RODMAN invented his admirable system of cooling guns, and Capt. WALBACH, in a classification of 2,808 guns made prior to 1841, proved that the improved system of manufacture was thoroughly well founded. The density and tenacity of the cast iron in guns was raised far above the standard previous to 1841 as follows:

	Density.	Tenacity.
Guns cast prior to 1841	7·148	23,638 lb.
" " in 1851	7·289	37,774 "

To Capt. WALBACH is due, so far as I know, the credit of first bringing chemical research to the aid of the engineer. He foresaw the importance of a field of investigation more extended than the mechanical one, and it became the cherished object of his life to procure the invaluable knowledge flowing from an inquiry into the chemical constitution of all elements entering into gun manufacture, from the raw material to the finished product.

Owing to the metallurgical skill attained by Major WADE, who afterward connected himself with the Fort Pitt foundry, our guns were long regarded as superior to any in the world, and have only recently yielded the palm to KRUPP's steel, and to the Woolwich 35 and 81-ton Babies with steel tubes.

In the manufacture of cast iron guns more particular attention was paid to tensile strength, hardness and density, especially in the raw material. I collect the following information of general interest:

CHARCOAL PIGS OF NO. 1 IRON MADE AT THE AMENIA FURNACE.

	Density.	Tenacity.
Blast 250°	6·948	11,420 lb.
" 200°	6·978	12,970 "
" 150°	6·967	12,243 "
" Cold	7·071	14,140 "

KENT FURNACE NO. 2 PIGS.

Cold blast	7·315	24349 "

The specific gravity of the different grades of cold blast charcoal iron *pigs*, usually used, was determined as follows:

GREENWOOD PIGS: FOUNDRY IRON.

	Density.	Tenacity.
No. 1	7·004	14,486 lb.
No. 2	7·153	27,153 "
No. 3	7·245	34,424 "

These figures show the striking difference in the density of different grades of the same pig iron. At some future time I hope to have the opportunity of presenting a reliable method of determining the grade in disputed cases, partially based on this property. A variation of 2·8 per cent. in the density is quite as indicative of change and is far more easily determined than one of 2·8 per cent. in the carbon.

In the Amenia and Greenwood No. 1 pig irons the following effect was produced by remelting:

	Fusion.							
	1st.		2d.		3d.		4th.	
	Density.	Tenacity.	Density.	Tenacity.	Density.	Tenacity.	Density.	Tenacity.
Amenia No. 1	6·948	11,420	7·172	26,310	7·322	34,728	....	
Greenwood No. 1	7·032	15,129	7·086	21,344	7·198	30,107	7·301	35,786

The transverse strength of bars of No. 1 iron was similarly increased by four re-meltings from 5,290 to 9,448 pounds per square inch. But repeated fusion finally brings the density to a point at which the iron loses strength rapidly. Thus in the case of Greenwood iron this point was determined as 7·27, and the iron possessed at 7·272 a tenacity of 40,897 pounds per square inch.

Observation of these points and a combination of different grades with each other, or with different fusions, enable the founder to produce cast iron of any desired density and strength. For instance, at Fort Pitt, the iron had a density of 7·290, and a tenacity of 39,934, and at West Point, a density of 7·260, with a tenacity of 38,093. The pig irons of course were different.

The first attempts to measure accurately the comparative hardness of metals were those of Major WADE. A blunt pyramid, the sides and opposite angles of the base of which were equal, was used to determine the hardness. The softness being directly as the bulk of the indentation, and the indentation made by the whole body of the pyramid being taken as 0, an accurate comparison was instituted between different metals and grades of pig iron. In Greenwood pig iron the different grades showed the following scale of hardness:

Pigs of No. 1	8·48
" " No. 2	13·86
" " No. 3	21·40

No. 3 being about 2½ times as hard as No. 1. The extremes of hardness noted were No. 1 pig iron or soft bronze, with a hardness of 4·57, and hard cast iron with one of 33·51.

The tenacity, transverse, torsional, and compressive strengths, all vary directly as the density except the tenacity, when the density has passed a given highest point. The range of density in metal available for guns seemed to lie between 7·051 and 7·272, with a respective tenacity of 18,922 and 40,897, though at Fort Pitt iron, of a density of 7·306 possessed a tenacity of 42,425, rising to 44,917 and 45,970 in different parts of the same gun.

The result of all the experiments was, that while some kinds of pig iron were susceptible of very great improvement by different methods of treatment at the foundry, other kinds were at their maximum strength in the crude pigs. And although, in general, a very close relation existed between the density and tenacity, yet there are exceptions, either when a medium tenacity accompanies a high density, or a low density is coupled with fair strength. In the first case the limit of density has been passed, and in the second an unusual chemical or physical state of the metal exists. But cast-irons of the same density did not possess the same tensile strength, nor was the cause of the limit of density understood. With a view to determining the cause of these obscure relations between the properties of cast-iron, a laboratory was established at Pikesville Arsenal in 1849, in charge of Messrs. MORFIT & BOOTH, under general direction of Capt. WALBACH. Their chemical work continued, with some interruptions, for nearly six years, covering a field which, though not untrodden, had never been explored with critical accuracy. After making some thousand determinations to compare processes and insure accuracy, Messrs. MORFIT & BOOTH embodied the result in their final report in 1855, which contained the complete analysis of the cast-iron of 32 guns, fully described by Capt. WALBACH. This report embodies a complete system of iron analysis, perfect for the time, and still authority on many elements.

These guns were cast before 1841, at different foundries, of different irons and mixtures. Consequently, any agreement of results is much more worthy of credence than it would be, were the experiments made at a single foundry where an effort was made to insure uniform results. I append a table containing extracts from the analyses of 27 guns, cast between 1827 and 1841, and arranged in the order of their density. The elements mentioned are the only important ones.

ANALYSIS BY MORFIT AND BOOTH.

NAME AND NUMBER.	Specific gravity.	Tensile strength.	Graphite, per cent.	Combined carbon, per cent.	Silicon, per cent.	Sulphur, per cent.	Phosphorus, per cent.	Manganese, per cent.
18 W. P. F.	7·020	18,758	2·80	0·30	1·17	0·07	1·01	....
54 C. F.	7·040	18,335	3·20	0·70	1·13	0·01	0·80	1·44
225 F. P. F.	7·060	13,399	3·25	0·45	0·82	....	0·71	1·81
56 C. F.	7·080	18,335	3·20	0·80	1·08	0·03?	0·75	1·30
364 B. F.	7·080	20,874	2·45	0·85	0·65	0·01	0·48	2·97
21 F. P. F.	7·080	22,425	2·65	....	1·02	0·06	0·88	1·30
46 "	7·080	21,579	2·70	0·70	0·98	0·03	0·04	2·17
301 W. P. F.	7·085	20,875	3·00	1·20	1·79	....	0·62	2·24
42 F. P. F.	7·090	22,425	2·90	0·90	0·90	0·05	1·29	1·81
322 W. P. F.	7·090	24,823	2·65	1·20	1·74	....	0·84	3·54
366 B. F.	7·110	20,028	2·80	0·15	0·73	....	0·73	2·31
325 W. P. F.	7 124	19,464	2·80	0·20	2 00	....	0·66	5·21
9 F. P. F.	7·130	22,284	2·30	0·40	1·43	....	0·80	2·24
7 "	7·140	23,131	2·40	2·10	0·52	....	0·80	1·95
6 C. F.	7·150	19,605	2·75	1·35	0·70	trace.	0·57	2·89
20 F. P. F.	7·170	26,939	2·15	0·95	1·00	0·03	0·72	2·02
307 W. P. F.	7.185	25,105	2·40	1·70	0·75	0·01	0·53	2·46
248 C. F.	7·190	26,516	2·10	1·40	0·58	....	0·80	2·31
344 B. F.	7·200	29,619	2·50	1·60	0·52	....	0·97	3·77
27 C. F.	7·210	31,311	1·45	2·55	03·2	....	0·44	2·82
28 "	7·220	31,734	2·20	1·70	03·2	....	0·43	3·54
119 W. P. F.	7·220	26,799	2·30	1·95	0·65	0·02	0·51	1·44
12 F. P. F.	7·220	31,029	1·80	1·50	1·41	....	0·48	3·25
131 C. F.	7·220	26,657	2·10	2·30	0·67	0·03	0·48	0·72
17 W. P. F.	7·227	28,631	2·20	2·40	0·72	....	0·48	2·31
10 F. P. F.	7·230	29 196	1·85	1·35	1·43	0·09	0·66	1·52
10 W. P. F.	7·245	31,734	2·00	2·20	0·77	....	0·03	2·10

W. P. F. denotes West Point Foundry; F. P. F. denotes Fort Pitt Foundry; C. F. denotes Columbia Foundry in Georgetown, D. C.; and B. F. denotes Bellona Foundry, near Richmond.

TO BE CONTINUED.

Gold and Silver Mining Notes.

The operations of the U. S. Mint at Denver, Colorado, during the year 1875, amount to $755,180.87. The mining industry of Colorado has been carried on 16 years, and the total product is estimated at $55,000,000.

Eureka Bullion for 1875.—Our mines and furnaces have been doing extremely well the past seasn, and are still looking and yielding better than at any previous time in the history of the district. From Mr. HILL, WELLS, FARGO & Co.'s agent at Palisade, we learn that there have been shipped from here during the present year 22,124,146 pounds of crude bullion. This is exclusive of the refined bullion forwarded by the Richmond company, and which must have aggregated a very considerable sum, though we have not the exact figures. Our principal mines are the Eureka Consolidated, Richmond, K. K. and Atlas, and nearly all of the vast quantity of bullion noted above came from these mines. The largest shipment was made in July, amounting to about $3,000,000 pounds During the present month, up to the 18th the shipments aggregated 1,687,876 pounds, which is considerably in excess of shipments for the same number of days for any prior period. With the advantage furnished by the construction of the Eureka and Palisade railroad we shall expect our bullion product to be nearly double in 1876.—Eureka, Nevada, *Sentinel*.

The Gila Silver Mine, Nye Co., Nev.—From the annual report of the superintendent of this mine we extract the following: There have been, for the purpose of exploring and taking out the ore at the mine, 1,528 feet of drifts run, 244 feet of winzes sunk, 226 feet of upraises made, 100 feet of cross-cuts run, 212 feet of shaft sunk and 126 feet of tunnel run. 1,201 tons of ore have been extracted, 1,172 tons of which have been shipped twelve miles to the company's mill and worked; the average assay value of which has been $300, and the bullion product $285,200.27, showing an average of 78 per cent. obtained from the ore. The tailings have been carefully saved and 219 tons of those first run out have been put into the mill and reworked,

yielding about 40 per cent of their assay value in a base low grade bullion. 1,728 pounds of ore have been sent to the smelting works at Tybo for reduction, the assay value of which was $110.59 to the ton, and the balance is now at the mill awaiting reduction. From the secretary's report we learn that the receipts from all sources during the year were $287,896.10. The total amount of disbursements, including two dividends of $25,000 each, were $267,698.44. The amount of money now in the treasury is $20,197 66. We note recent sales of the stock of the above company (there being 100,000 shares) in the San Francisco stock market at $3 per share.

The Idaho Gold Mine, Grass Valley, California, produced last year $492,919 in gold, and paid $172,050 in dividends. The following shows the product and dividends of the mine since 1868:

	Production.	Dividends.		Production.	Dividends.
1869	$806 039	$170,500	1873	$1,010,612	$682,000
1870	183,450	37 200	1874	669,024	317,750
1871	407,302	232,500	1875	492,919	172,050
1872	404,035	162,750			
			Total	$3,473,381	$1,774,750

By failure of THOMAS FINDLEY it had $32,490.68 locked up, causing the passing of the November dividend, and the December to $3. The other ten months it paid a dividend of $5 per share, with the exception of March, when $7.50 was paid. There are 3,000 shares in the corporation, and the stock is mostly held in the neighborhood of Grass Valley. The average yield of the ore mined by this country during the year was equal to about $17.73 per ton.

Quicksilver Product of the New Almaden Mine.—Through the courtesy of Mr. J. B. RANDOL, general manager, we are enabled to give the production of the New Almaden mine for the year 1875, in flasks of seventy-six and a half pounds each:

Months.	Flasks.	Months.	Flasks.
January	850	August	1,100
February	800	September	1,200
March	1,033	October	1,250
April	850	November	2,700
May	1,095	December	1,500
June	1,050		
July	1,220	Total	13,648

The total product of the mine for 1874 was 9,084 flasks, making the increase this year 4,564 flasks, or nearly fifty per cent. Those who supposed, from the low production of last year, that the New Almaden had nearly given out, will be surprised to learn of the great increase in production this year.

The mine still holds its well-earned reputation of being the most productive quicksilver mine in California, and, consequently, in the United States. For several years the percentage of ore worked was something marvelous. The first year the mine was worked the ore yielded 36.74 per cent. In 1874 the product was 2.96, and the yield the smallest experienced at the mine. The total product of the mine from July, 1850, to December, 1875, has been 612,173 flasks of quicksilver, of seventy-six and a half pounds each. At the mine many improvements in the reduction of ore, etc., have been made by the manager, J. B. RANDOL and the foreman, Mr. FIEDELER. As soon as it can be prepared we shall publish a table, showing the production of quicksilver at New Almaden, from July, 1850, with all the details of yield of classes of ore, etc.—*Scientific Press*, Jan. 8, 1876.

SELECTED LIST OF PATENTS.

FOR THE WEEK ENDING JAN. 14, 1876.

RELATING TO MINING, METALLURGY, GAS MAKING, ENGINEERING, &c. REPORTED FOR THE "ENGINEERING AND MINING JOURNAL" BY LOUIS BAGGER & CO., SOLICITORS OF PATENTS, WASHINGTON, D.C.

171,689. Shafting, Wm. L. McNair, Allegheny, Pa.—A screw-threaded sleeve works into corresponding screw-threaded ends of each section, to form and tighten the joints, the outside of the sleeve and shafting being flush. A strengthening solid double cone plug is first fixed centrally to the joint inside.

171,747. Ore-Concentrators, James M. Thompson, San Francisco, Cal.—The pan is mounted upon hinged standards, whose angle and length are adjustable. The forward standards are also mounted on springs. As the ore accumulates in the forward end of the pan the springs are compressed, a gate opens, and a portion of the ore is discharged. An automatic rake removes the lighter portion. The upper ends of the standards are made in the form of segments of spheres, so that the motions of the pan are in the right lines.

171,772. Processes for Lining or Fettling Puddling Furnaces, J. A. Burden, Troy, N. Y.—The method of lining or fettling puddling furnaces, by throwing in coarse and fine iron ore, mixed together as it comes from the mine, forming therewith a sloping bank or wall, and coating and compacting it together by dashing over it melted cinder from the furnace.

171,785.—Bits for Metal Drills, Theo. P. Farmer, Boston, Mass.—The outside of the drill is cut away from the point to the rear, to give clearance or prevent friction in drilling deep holes.

171,811. Apparatus for Deoxodizing Iron Ores, A. G. Hunter, Detroit, Mich.—Ore and carbonaceous material are fed through the hoppers, and fill the spaces between the tubes in the reducing chamber. The hot products of combustion from the gas and air pipes at the top of the furnace pass down through the tubes and side flues to the dust flue below the chamber, and thence to the chimney. The tubes and flues thus heated heat the ore and carbon sufficiently to cause them to react on each other. The iron sponge is drawn off below.

171,874. Anti-Friction Bearings, A. B. Sheldon, New York, N. Y.—Plumbago united by cement to reticulated or perforated surfaces.

171,886. Steam and Vacuum Pumps, B. C. Vanduzen, Cincinnati, Ohio.—The screens check the upward throw of water, and the steam passing through them heats the water to such a degree that but little condensation takes place when the steam strikes the water. The valve in the steam-chest governs the admission of steam to the two water chambers alternately. Water is injected through a side pipe automatically into the chambers, to assist condensation, the quantity of which is regulated by a valve in said side pipe.

STATISTICS OF COAL PRODUCTION.

Duties.

Anthracite free, *Bituminous*, per ton of 28 bushels, 80 lb. to he bushel, 75c., gold.

All *slack*, or *culm*, such as will pass through a half-inch screen, per ton of 28 bushels, 80 lb. per bushel, 40c. gold.

Not otherwise provided for, per ton, 40c. gold.

This is the only Report published that gives full and accurate returns of the production of our Anthracite mines.

Comparative Statement for the week ending Jan. 22.

Tons of 2,240 lb.	1876.		1875.	
	Week.	Year.*	Week.	Year.*
Wyoming Region.				
D. and H. Canal Co	45,005	118,547	48,495	137,170
D. L. and W. RR. Co	43,575	124,325	38,483	118,285
Penn. Coal Co	25,019	74,148	20,997	70,893
L. V. RR. Co	23,737	65,674	18,803	61,090
P. and N. Y. RR. Co	757	2,152	....	....
C. RR. of N. J	23,735	55,399	1,621	6,471
	161,828	440,175	128,459	393,909
Lehigh Region.				
L. V. RR. Co	34,917	100,097	3,549	66,449
C. RR. of N. J	27,600	74,683	....	....
D. H. and W. B. RR.	....	....	401	778
	62,547	174,780	3,950	67,227
Schuylkill Region.				
P. and R. R. RR. Co	48,935	67 559	10,935	36,954
Shamokin & Lykens Val.	2,031	10,444	1,741	13,285
	50,966	78,003	12,676	50,239
Sullivan Region.				
Sul. and Erie RR. Co	1,282	2 949	207	755
Total	276,623	695,907	145,292	512,130
Increase	131,331	183,777	..	..
Decrease	..	..	..	..

* Year beginning January 1st.

The above table does not include the amount of coal consumed and sold at the mines, which is about seven per cent. of the whole production.

The receipts at Port Richmond for the week were 4,000 tons, shipments 4,000 tons, and balance on hand 136,000 tons.

The decrease of shipments of Cumberland Coal over the Cumberland Branch, and Cumberland and Pennsylvania Railroads amounts to 949 tons, as compared with the corresponding period in 1875.

Perth Amboy business:

	Tons.
Received for the week	8,819
" from Dec. 1st, 1875	....
Shipped for the week	5,722
" from Dec. 1st, 1875	....
On hand Jan. 15	92,762

Receipts of Coal at Boston, for week ending Jan. 22, and years from September 1st, 1874 and 1875.

From	Week. Tons.	Previously. 1875. Tons.	1874. Tons.
Alexandria and Georgetown	—	50,902	45,700
Philadelphia	2,320	324,742	239,572
Baltimore	1,020	59,385	61,464
Other places	6,522	128,397	96,792
Great Britain	—	854	1,733
Nova Scotia	—	12,616	14,105

The Exports of Coal from Baltimore for the week were 650 tons, and since Jan. 1st, 3,302 tons, as against 4,267 tons for the corresponding period of 1875.

Belvidere Delaware RR. report.

	Week.	Year 1876.	Year 1875.
Receipts of coal at Coal Port (Trenton)	—	..	..
" " South Amboy	18,057	48,457	10,635
Shipments of Coal Port (Trenton)	—	..	..
" South Amboy	4,623	22,739	16,669

COAL TRADE REVIEW.

NEW YORK, Friday Evening, Jan. 27, 1876.

Anthracite.

The mild weather of the week has lessened the demand for all the domestic sizes, and the fact that prices are to be reduced in February, as we announced last week, has caused a postponement of orders where that is possible. Consequently the market is exceedingly dull, and the extreme difficulty of making collections gives a somewhat gloomy tone to the general feeling of the trade.

The question of the programme for the current year is attracting much attention, but nothing definite has as yet been done or decided upon. The meeting of the combined companies takes place to-morrow when the question will be discussed and, probably, decided. Since the result of this meeting will be known so soon after the publication of this, it is quite unnecessary to speculate as to what will be done. There seems to be a very general feeling in the trade in favor of season contracts with manufacturers, that is, with all large consumers, and steam or manufacturing sizes will open at a price considerably below the figures of last year. On the other hand it is not expected, at present, that other kinds will be reduced below the opening prices of 1875, nor is any reduction in wages or in railroad freights talked of. The reduction in the price of steam coal intended to meet the competition from bituminous coal, indicates a somewhat tardy appreciation of the situation, and is a greatly needed concession to the needs of our distressed manufacturing industries; it will tend to increase the consumption, a matter of even greater importance than any profit there may be on the sale of one particular size of coal.

It is useless to speculate in advance on so uncertain a thing as the policy of the Combination, and it would be great presumption in us to pretend to instruct the able heads of the anthracite trade on the manner in which it should be managed, but our position gives us opportunities that they do not possess of hearing both sides of the question, and he is a wise man who listens with respect to the opinion of his rivals. It is far easier to find fault with, and point out the errors in any policy than to devise a better. Yet criticism is not for that reason useless, on the contrary, it points out where to modify with advantage the rules for carrying on this great business.

It is generally supposed that had the combination leaders fully appreciated the seriousness of the financial panic of 1873 their action would have been very different from what it was. In forming their plans for the present year they should carefully consider the present condition of unexampled depression, which obtains in every department of trade. At no time since the panic have collections been so difficult or failures so numerous as at the present moment, and while we have the most implicit faith in the future prosperity of the country, we can see no reason to expect any very rapid revival in any branch of business before the autumn of the present year, till the Centennial Exposition and the Presidential Election have passed and allowed business to settle into a more settled condition than can be expected while these disturbing elements are on the *tapis*.

With this outlook it appears to us the interest of the coal companies as well as those of manufacturers and consumers generally will best be served by a reduction in prices to the lowest practicable point, for this will hasten that revival of business in which the companies have more to gain than in any trivial temporary advantage in rates.

The Production of anthracite coal for the week ending the 22d inst. was 276,623 tons, as against 230,009 tons for the week previous, and 145,292 tons for the corresponding week in 1875 The total production from January 1st, was 695,907 tons as against 512,130 tons during the like period of 1875. The above figures show an increase for last week, as compared with the previous week, of 46,614 tons, and 131,331 tons as compared with the corresponding week of 1875. The total increase since January 1st, as compared with 1875, was 183,777, tons.

Bituminous.

There is but little doing in "soft" coal, few orders at any of the shipping ports, and vessels abundant. The Cumberland companies are inactive. Our notice last week of the apparent policy of the Consolidation Coal Company has already attracted much attention, and, judging from the inquiry and communications on the subject—some of which will appear next week—it will call for some answer on the part of the company, to the figures and statements made.

It is understood that Mr. CAMPBELL, the President of the Consolidation Coal Company, who was recently ap-

pointed Commissioner of Public Works of this city, is again a candidate for the presidency of the company. There seems to be much opposition to him among the stockholders, and it is by no means certain that he will be re-elected. Indeed, the management of the Coal Company, as given in our article above referred to, is scarcely such as to justify the speculation that even so able a gentleman as Mr. CAMPBELL can conduct efficiently at the same time two such important and arduous trusts as those of the Public Works of the city of New York and the Consolidation Coal Company. Either of those would tax to the utmost the abilities of any ordinary man.

The action of the anthracite companies, should they reduce season prices to manufacturers, will doubtless be a further incentive to secure a reduction in the cost of marketing bituminous coal, and the competition will probably leave but small margin for profits in either the Cumberland or Clearfield Regions.

Philadelphia Coal Trade.

PHILADELPHIA Jan. 27, 1876.

There is no new feature to report in the coal trade here. The dealers are filling up to provide for the stoppage which is to take place at the end of next week, and the trade continuing dull, they are rapidly filling up. Conferences are taking place between committees representing the Lehigh and Schuylkill Regions, and many details are getting arranged, for the want of which the Schuylkill Region suffered heavily last year. A schedule has been adopted establishing the difference in prices of Lehigh coal at Berks street, and Schuylkill at Ninth street, by which, Lehigh, at the first place, will cost, 35c., for lump; 25c., for steamboat; 20c., for egg and broken; 30c., for stove, and 50c., for chestnut, more than Schuylkill, at the last place. What share the producer and the transporter will head is a matter for future adjustment. The lowering of prices on board, 1st prox., has not assisted the trade, and naturally creates some ill feeling on the part of those who depended on the assurances the combined companies allowed to circulate.

Wholesale Prices of Anthracite Coal for Feb. f.o.b. at the Tide Water Shipping Ports per ton of 2240 lb.

	Lump.	Steamer.	Grate.	Egg.	Stove.	Chestnut.
Wyoming Coals.						
Lackawanna and Scranton at Hoboken and Weehawken	4 65	4 65	4 75	4 95	5 50	4 70
Pittston at Weehawken	4 50	4 50	4 60	4 80	5 35	4 55
Wilkesbarre at Port Johnston	4 65	4 65	4 75	4 95	5 50	4 70
Plymouth, R. A., *Net*	....	....	4 75	4 95	5 50	4 70
Susque. Coal Co. at Amboy W.A.	4 65	4 65	4 75	4 95	5 50	4 70
Kingston at Hoboken	4 65	4 65	4 75	4 95	5 50	4 70
Lehigh Coals.						
Old Company at Port Johnston	5 25	....	4 90	5 00	5 50	4 85
Old Company's Room Run "	5 25	....	4 90	5 00	5 50	4 85
§Sugar Loaf, Hobok. &Amb."	5 25	....	4 90	5 00	5 50	4 85
Lehigh Coal Exchange "	5 25	....	4 90	5 00	5 50	4 85
Honey Brook Lehigh	5 25	....	4 90	5 00	5 50	4 85
Beaver Meadow at South Amboy	5 25	....	4 90	5 00	5 50	4 85
Schuylkill Coals at North 9th st., Brooklyn, E. D.						
Schuylkill white ash	4 65	4 65	4 75	4 95	5 50	4 70
Schuylkill red ash	...	....	....	5 05	5 55	4 70
Shamokin white and red ash	....	....	....	....	5 70	4 75
Lorberry	....	....	....	....	....	....
Lykens Valley	...	....	6 40	6 40	6 40	...

	Per ton.
Freight from Hoboken and Weehawken to New York	40c.
" " Elizabethport & Port Johnston to N. York.	45c.
" " South Amboy to New York	50c.

Wholesale Prices of Bituminous Coal.

Domestic Gas Coals.

Per ton of 2240 lb.	At the Shipping Ports.	Alongside in New York.
Westmoreland and Penn. at Greenwich, Philadelphia	$5 20	$6 50
" " at S. Amboy	6 00	6 50
Red Bank Cannel Pa. at Philadelphia	8 00	8 50
" " South Amboy	8 50	....
" Orrel	6 00	6 50
Youghiogheny, Waverly Co., at Balt	5 00	6 50
Despard, West Va.,	5 00	6 50
Murphy Run, West Va., at Baltimore	4 75	6 30
Fairmount, West Va,, " "	4 75	6 50
Newburgh Orrel, Md. " "	4 75	6 50
Cannelton Cannel, W. Va., at Richmond.	9 50	11 00
" Splint, " "	5 00	6 50
Peytona Cannel, " "	9 50	11 00
Straitsville " at Sandusky, O	3 25	10 00

Foreign Gas Coals.

	Sterling.	Am. cur'cy,
Newcastle, at Newcastle-on-Tyne	10/6@12/9	6 50@ 7 00
Liverpool House Orrel, at Liverpool	26/	13 00
Ince Hall Cannel "	47/	18 00@20 00
" Gas Cannel "	32/	£d 13@14
Scotch Gas Cannel, at Glasgow, nominal,	25/	7 50
	Gold.	
Block House, at Cow Bay, N. S	2 00	5 50
Caledonia, at Port Caledonia	1 75	5 25
Glace Bay, at Glace Bay	1 80	5 50
Lingan, at Lingan Bay	1 75	....
Sydney, International and Reserve mines, at Sydney	2 00	5 50
Pictou, Albion & Vale mines, at Pictou.	2 25	5 75

Steam and House Coals.

Broad Top, at the mine, $1 25; at Amboy	4 75@5 00	5 25@5 50
Cumberland, at Georgetown and Alexandria, Va	4 00@4 25	5 25@5 50
Cumberland, at Baltimore	4 25@4 35	5 75@6 00
Clearfield and Allegheny, "Kittanning," "Sterling," "Sonman," and "Eureka," at the mines, 90; at Greenwich, Phil	4 25	5 65

Retail Prices in New York.

Anthracite.

Per 2000 lb.	Grate and Egg.	Stove.	Chestnut.
Pittston coal, in yard	$5 50	$5 80	$5 00
Lackawanna coal, delivered	6 75	7 00	6 25
Wilkes-Barre, "	7 00	7 25	6 50
Lehigh & Locust Mountain, del'd	7 25	7 50	6 75
Schuylkill Red Ash, del'd	7 50	8 00	

Our retail quotations of Pittston Coal are based on the actual selling rates of the company, nominal quotations of grate and stove are 20c., and of nut 30c. per ton above these rates. The Cost of delivery ranges from 40 cts. to $1 10 per ton, according to distance from the yard.

Bituminous.

Liverpool House Orrel, delivered, per ton of 2000 lb				$23 00
Liverpool House Cannel	"	"	"	25 00
American "	"	"	"	15 00
Kanawha splint,	"	"	"	15 00
American Orrel	"	"	"	11@14
Red Bank Cannel	"	"	"	14 00
Cumberland	"	"	"	9 00

Baltimore, Md. Jan. 25, 1876.

Reported by our Special Correspondent.

No change.

ANTHRACITE.

Wholesale or Trade Prices per 2240 lb.

Wilkes-Barre "Lee" or "Diamond," Pittston and Plymouth. White ash.	In cars at depot.	By boats afloat.
Lump and steamboat	$4 80	$4 65
Broken	5 55	5 40
Egg	5 92	5 77
Stove	6 17	6 02
Nut	4 97	5 10
Shamokin, (red or white ash), and "Boston," freeburning white ash,		
Egg	5 95	5 79
Stove	6 15	5 99
Lykens Valley, red ash,		
All sizes	6 55	6 37

From wharf or yard, wholesale, 50@75c. additional.
By retail, all kinds and sizes, per 2240 lb. $7 00@8 00.

BITUMINOUS.

George's Creek and Cumberland f. o. b. at Locust Point	4 15 @ 4 50
West Virginia f. o. b. at Locust Point	5 50
Youghiogheny Gas, f. o. b. at Locust Point	5 50
Swanton Coal, George's Creek	4 40

Boston. Jan. 25, 1876.

Reported by our Special Correspondent.

CARGO PRICES TO TRADE.

Lingan coal	$ 5 20	Westmoreland and Penn.	6 85
Caledonia	5 00	Waverly Co. Youghiogh'y.	6 80
Pictou	5 60	Cannelton Cannel	11 60
Block House	5 20	Cumberland	5 80@ 6 00
Red Bank Cannel	9 00	Anthracite	.6 50@ 7 25
Glace Bay	5 00	" retail	.7 50@ 8 00
Sydney	6 25		

Buffalo, N. Y. Jan. 25, 1876.

Reported by our Special Correspondent.

No change to note this week.

ANTHRACITE.

	Afloat. f.o.b.	Retail, Deliv'd.
Grate	$6 40	$7 40
Egg	6 40	7 40
Stove	6 85	7 85
Nut	6 60	7 60

	Lump.	Run of Mine.	Nut.	Slack.	Nut & Slack.
Connellsville Coke	$5 25	....	....	....	....
Brookfield Coal	....	....	....	....	....
Briar Hill	4 50	....	....	....	3 00
Youghiogheny	4 75	....	....	....	....
Monterey	3 75	3 50	3 25	2 50	....
Catfish	3 75	3 50	3 25	2 50	....
Stoneboro	....	....	3 25	2 50	....
Sterling Cannel	5 50	....	....	....	....
Buffalo Coal Co	3 50	3 25	....	2 30	....
Cameron	....	3 25	....	....	....

Chicago, Ill. Jan. 25, 1876.

Specially reported by Messrs. RENO & LITTLE, Coal Merchants.
Retail prices per ton of 2000 lb. delivered to buyer.

No change in prices of coal.

		BITUMINOUS.	
Lehigh Lump	$10 50	Briar Hill and Erie	@ 7 00
Lehigh grate and egg	10 50	Walnut Hill, Pa	@ 6 50
Lehigh stove and chest	11 00	Midway, Pa	@ 6 50
Lackawanna, Wilkes Barre and Pittston*		Cannel	@ 8 00
		Blossburg	7 50
Grate and egg	9 50	Indiana Block	6 00
Stove and chestnut	10 00	Hocking "Brooks"	6 50
		Wilmington and Illinois	5 00

* 50 cents off these prices for car load lots to country dealers and manufacturers.

Cincinnati, O. Jan. 25, 1876.

Reported by our Special Correspondents.

Please quote following rates on coal here:

Per ton of 2000 lb.	Bush.	Ton.
Youghiogheny, or Pittsburgh, afloat	7½c.	—
Pomeroy coal	5 c.	—
Kanawha " "	7½c.	—
Cannel coal, according to quality "	16 c.	—
Semi-Cannel "	7½c.	—
The following are the retail prices delivered		
Youghiogheny —c.		$3 00
Semi-Cannel —c.		3 50
Pomeroy 11c.		2 50
Cannel —c.		5 50
Kanawha Semi-Cannel —c.		3 00
Anthracite	10 00@11 00	
Coke, at yard 7c.		—
Coke, hard and soft, delivered 11c.		—

Cleveland, O. Jan. 25, 1876.

Specially reported by Messrs. WARNER, BATES & Co.

WHOLESALE.

Per ton of 2000 lb. f. o. b. vessels.

	For vessels,	On cars.
Youghiogheny Gas Coal	$4 40	$4 15
Cannel	4 50	4 15
Blossburgh	5 00	5 00
Briar Hill Block Coal	3 80	3 60
Hocking Valley	3 25	3 10
Straitsville Coal Co., lower vein	3 25	3 10
Massillon	3 10	3 30
Tuscarawas Valley	2 85	2 70
Columbiana	2 80	2 60

RETAIL DELIVERED.

	Lump.	Nut.
Briar Hill	$5 00	$3 50
Massillon	4 50	4 00
Mineral Ridge	4 50	4 00
Columbiana	3 25	3 00
Straitsville Coal Co., lower vein,	4 00	3 00
Tuscarawas Valley	3 25	3 00

ANTHRACITE DELIVERED.

	Grate.	Egg.	Stove.	Chestnut.
Lehigh	$9 00	$9 00	$9 50	$9 25
Wilkes-Barre	8 10	8 10	8 50	8 25
Lackawanna	8 10	8 10	8 50	8 25

Detroit, Mich. Jan. 25, 1876.

Specially reported by Messrs. ROBINSON & KEYS, Dealers in all kinds of coal.

Per ton of 2000 lb.

Lehigh Lump, per ton	$10 50	Blossburg	8 50
Lehigh " prep. sizes.	10 00	Briar Hill	7 50
Wilkes-Barre, Grate and Egg	9 00	Willow Bank	7 00
Wilkes-Barre, Stove and Nut	9 50	Erie	50
		Massillon	7 00

Erie, Pa. Jan. 25, 1876.

Wholesale, per ton of 2000 lb. Bituminous f. o. b.

Briar Hill lump	$3 75	Beaver lump	$3 50
Midway	3 25	Cat Fish	3 00

Indianapolis, Ind. Jan. 25, 1876.

Specially reported by Messrs. COBB & BRANHAM.

We quote coal in our market as follows:
Wholesale on board cars, and retail delivered to consumers.
Per ton of 2000 lb., bushel of 70 lb.

BITUMINOUS.

Indian Creek, per ton	$2 75	Peytona cannel, per ton.	7 00
White River, "	2 75	Indiana Cannel	6 50
Brazil Block, "	2 90	Hocking Valley	4 25
Highland, grate, "	2 50	Youghiogheny	4 75
Block coal, nut, per car	18 00	Blossburg (smithing)	6 50
Highland " "	18 00	Piedmont "	6 50
Block Slack "	17 00	Gas coke, per bushel	10

ANTHRACITE (Lackawanna and Wilkes-Barre.)

Broken	$8 70	Nut	8 75
Egg	8 70	Stove	9 00

Lehigh Anthracite.

Broken	10 35	Nut	10 35
Egg	10 35	Stove	10 00

Retail, per bushel, delivered.

Sand Creek	16c.	Block Nut, steam	9
White River	14	" Slack, "	8
Brazil Block	15	Peytona Cannel	28
Highland grate	13	Virginia "	27
Block Nut, domestic use.	12	Youghiogheny	22
Highland Nut, "	12	Blossburg	26
" " steam	9	Piedmont	26

GAS COKE (measured.)

Crushed	15c.
Lump	12c.

ANTHRACITE.

Wilkes-Barre and Lackawanna (all sizes)	$9 75 per ton.
Lehigh, retail	$11 50 per ton.

Louisville, Ky. Jan. 25, 1876.

Specially reported by Messrs. BYRNE & SPEED.

WHOLESALE.

	per bushel		per bushel
Pittsburgh	10c	Pine Hill	—
Raymond City	9c.	Kentucky	—

RETAIL.

	per bushel		per bushel
Pittsburgh	14c.	Peytona Cannel	20@22c.
Raymond City	13c.	Buckeye "	—
Pine Hill	13c.	City-made Coke	11c.
Kentucky	12c.	Anth., per ton,	$10 00 to 10 50
Screened Pittsburgh per load			$3 00
Screened Raymond City			2 75
Pine Hill (Kentucky)			2 75
Cannel			$5 to 5 50

Milwaukee, Wis. Jan. 25, 1876.

Specially reported by Messrs. R. P. ELMORE & Co.

Up to the present there has been no change in the price of coal, and, from present appearances, we think the singularly mild weather will prevent any advance at least.

Retail price per ton of 2000 lb.

Lehigh Lump	$10 00	Briar Hill, select	$8 00
Lehigh Prepared	11 00	Blossburgh	8 00
Lackawanna (all sizes)	10 02	Cannel	8 00
Pittston	10 00	Pittsburgh	7 00
Scranton	10 00	Steam coal	5 00

New Orleans, La. Jan. 25, 1876.

Specially reported by Messrs. P. & R. DE VERGES, Wholesale and Retail Dealers in Pittsburgh, Anthracite, Cannel and other Coals.

Pittsburgh coal, retail, per bbl	55c.
" wholesale	28c.
" steamboats, per box	50c.
" to manufacturers, per bbl	45c.
" shipments, per hhd	$6 00
Anthracite, wholesale, per ton	....
" retail, "	....
Virginia Cannel, per bbl	80c.
Scotch " "	80c.
Mt. Carbon, wholesale, per bbl	...
" " retail, "	....
St. Bernard, wholesale, per bbl	50c.
" retail, "	....

Pittsburgh. Jan. 26, 1876.

COAL.—The general position of the coal trade hereabouts has not changed much recently; it is hardly necessary to say that it is unsatisfactory. The most notice

able feature is the resumption of navigation; the river is again in fine navigable condition, but the shipments have been small, as there was but little coal here ready to go, and besides, there is no inducement to ship, as the down river markets have been overstocked for some time past. At Cincinnatti the price has dropped to 8c. afloat, with but little selling. Coal delivered in buyers' barges here may be quoted at 4½@5¼ c. per bushel according to quality.

COKE.—Trade continues quiet, although it is about all that can be expected under existing circumstances; the consumption will continue light as long as so many of the pig iron furnaces are out of blast, as is the case at the present time, and no material change for the better can reasonably be looked for until there has first been a revival in the iron trade. Prices are nominally unchanged: $2 50 per ton, equal to about 5c. per bushel, delivered free on cars in Pittsburgh.—*American Manufacturer.*

Richmond, Va. Jan. 25, 1876.

Specially reported by S. H. HAWES, Dealer in Coal.

Per ton of 2240 lb., f.o.b.

Kanawha Cannel	$12 00	New River Bituminous,	$4 50
" semi-Cannel	4 75	Clover Hill Coal	4 25
Coalburgh Splint	4 75	James River Bitum	3 30
Lewiston "	4 75	" " Carbonito,	5 80
Kanawha Gas coal	4 50		

Toledo, Ohio. Jan. 25, 1876.

Specially reported by Messrs. GOSLINE & BARBOUR.

Per ton of 2000 lb. on cars.

Hocking Valley	$3 40	Massillon	4 00
Straitsville	3 40	Youghiogheny	5 00
Shawnee	3 40	Blossburg	7 00@7 50
" nut	2 90	Cumberland	7 00@7 50
Briar Hill	5 50	Connellsville coke	7 00
ANTHRACITE.			
Grate, screened	$7 50	Stove, screened	$7 75
Egg, "	7 50	Chestnut "	7 50
Lehigh Lump	9 00		

40 cents to $1 per ton additional for delivery at retail.

Toronto, Ont. Jan. 21, 1876.

Chestnut	$7 25
Stove	7 50
Egg and grate	7 25
Bituminous coal for domestic use	6 00
" " steam	3 50@5 50
Lehigh Lump and broken	7 50
Blossburgh	6 30

Montreal. Jan. 21, 1876.

Specially reported by Messrs. ROBERT C. ADAMS & Co.

Wholesale per ton of 2240 lb.

The mild winter and continued depression among manufacturers, restrict the consumption of coal, and the demand expected at the close of the season does not seem likely to be realized. Stocks will probably prove ample, and the the speculative purchases made in the fall will not be very remunerative. Quotations are:

Scotch Steam	$6 00	Cape Breton Steam	$5 25
Pictou "	5 75	Newcastle Smiths,	7 50
Anthracite at retail, per 2000 lb., delivered.			
Egg	$8 50	Chestnut	8 50
Stove	9 50		

Rates of Transportation on Anthracite Coal to Tide Ports.

Lehigh and Wyoming Coals. per ton of 2240 lb.	From Penn Haven.	From Mauch Chunk.	From Hazleton**	From Upper Lehigh.	From Ashley and Sugar Notch.
To ‡ Newark, N. J. (117 miles), via Central Railroad of New Jersey	2 60	2 40	2 93	2 93	3 16
‡ Mauch Chunk, Pa., via Central Railroad of N. J.	14	..	56	47	71
‡ Philipsburg, N. J., (46 miles)	99	85	1 32	1 32	1 65
Elizabethp't, (114 m.) Pt. Johns., Hoboken & South Amboy, N. J., shipping and wharfage 35c. add.	2 24	2 10	2 59	2 57	2 80
High Bridge, N. J.	2 40	1 95	2 80	2 54	2 72
Somerville and Raritan, N. J	2 80	2 35	3 20	2 35	3 12
Elizabeth, Cranford, Westfield & Elizabethport, for consumption,	2 60	2 40	2 95	2 93	3 16
¶ Jersey City, N. J., (121 miles) and New York, via L. V. RR	2 85	2 40	3 17	3 24	3 54
Andover, via Delaware, Lackawanna and Western RR	3 30	3 10	3 70	3 69	3 99
Trenton Somerset Junction and Greensburg, via P. RR. Belvidere Division	2 65	2 45	3 05	3 04	3 34
Trenton, (97 m.) for shipment, including shipping and wharfage	2 11	1 95	2 45	2 46	2 76
From *Mauch Chunk* to *New York* (121 miles), (towing limits) and Jersey City† via Lehigh Valley RR.					$2 37
From *Mauch Chunk* to *Philadelphia* (93 m.) via L. V. RR. and North Penn. RR					1 75
††From *Phillipsburg, N. J.* to *Hoboken* (84 m.) for shipment via Delaware Lackawanna and Western RR., Morris and Essex Division					1 24
From *Lackawanna Junction* to *Auburn, N. Y.*, (191 m.) for shipment, via Southern Central R R, in connection with Pa. and N. Y. R.R.					2 53
From *Lackawanna Junction* to ‖*Weedsport* (201 m.), for *Rochester and Charlotte*					2 59
From *Lackawanna Junction* to *Sterling* for *Oswego, N. Y.*.					2 02
‖ To this point for all places between Rochester and Buffalo the rate is					2 53
* The rate to this point for Syracuse is					2 03

** Rates on line coal from Hazleton are 10c. per ton above these figures.

‡ The cost of unloading is to be added to these rates. No charge less than 40c. per ton will be made for any distance. Tolls from Mauch Chunk to Phillipsburg for way points will be $1 15 per ton.

§ Twenty cents per ton less when five cars at a time to one party. Provided that where the reduction makes the rate $1 a ton, or less, the rate will be $1.

¶ 20 cents per ton additional for transferring coal from boat to boat, and 30 cents per ton for reshipment of same from wharves.

† Transportation on Coal destined for re-shipment from this point is 20c. less than above rate.

†† The rate for consumption to this point is $1 80.

The distances in the above table are computed from *Mauch Chunk*. From *Ashley* to *Mauch Chunk* the distance is 51 miles, and from *upper Lehigh*, 33 miles. From *Hazleton* 24 miles, and from *Penn Haven* 8 miles.

From *Wilkes-Barre* to *Perth Amboy* via the Lehigh Valley Railroad Company, the distance is 161 miles, and from *Mauch Chunk* it amounts to 106 miles.

Schuylkill Coals. per ton of 2240 lb.	From Pine Grove	From Tamaqua.	From Port Carbon.	From Mount Carbon.	From Schuylkill Haven.
To *Port Richmond*, for shipment, via P. & R. R. R., Main Line	2 12	2 07	2 00	1 99	1 92
Philadelphia, Retail yards	2 22	2 17	2 10	2 09	2 02
Harrisburg, via Lebanon Valley Branch	1 35	2 02	1 95	1 94	1 87
Allentown, via East Pennsylvania Branch	1 70	1 65	1 58	1 57	1 50
Lancaster, and Points on Lancaster Branch, via R. & C. R.R	1 82	1 77	1 70	1 69	1 62
Dauphin, via Schuylkill and Susquehanna Branch	85	....	1 43	1 42	1 35
Statedale Junction via Berks and Lehigh Branch	1 88	1 83	1 76	1 75	1 68
Lebanon, via Lebanon and Tremont Branch	96	....	....	....	....
From *Tamanend* to *Catawissa*, via Catawissa and Williamsport Branch Railroad					94
From *Tamanend* to *Williamsport*, via Catawissa and Williamsport Branch Railroad					1 39

Coal sent to points on the Catawissa and Williamsport Branch will be charged one and one-half cent per ton per mile, and two cents per ton additional to Tamanend.

The rates of freight and tolls on lump and steamboat coal (except that sent to Richmond for shipment) will be twenty per cent., and on broken coal will be ten per cent. less than the above rates.

Freights.

Per ton of 2240 lb.

Representing the latest actual charters up to Jan. 27, 1876. The following rates, with but few exceptions are nominal; our quotations, in many instances, representing rates which were ruling two months ago.

Ports.	From Philadelphia.	From Baltimore.	From Georgetown.	From Elizabethport, Port Johnson, South Amboy, Hoboken and Weehawken.
Augusta, Me	....	2 40	....	....
Albany	*85	1 70	...	....
Amesbury, Mass	....	....	....	....
Bangor, Me	†2 00	3 00	....	2 10
Bath, Me	1 60	2 75	3 00	1 30
Baltimore	....	....	....	....
Boston, Mass	§2 00	2 00	2 50	1 75
Bridgeport, Ct	*85	1 70	2 00	90
Bristol, R. I.	....	....	2 10	1 00
Cambridgeport, Mass.	§1 90	....	2 50	2 00
Derby	.. ..	1 65	....	....
Dighton	....	1 70	....	....
East Cambridge	1 90§	....	2 60	§2 00
Fall River	1 50	1 70	....	1 00
Hackensack	....	....	....	....
Hallowell, Me	....	....	....	....
Hartford	....	1 65	....	....
Hoboken	†85	1 40	1 75	40
Hudson	....	1 65	....	....
Jersey City	....	1 40	1 75	40
Lynn, Mass	†2 10	.. ..	....	†1 75
Middletown	....	....	....	1 25
Mystic	....	....	....	....
Newark	....	1 50	....	....
New Bedford	1 50	1 70	2 10	90
Newburyport	2 10	2 20	2 65	2 10
New Haven	*85	1 60	1§0@2	85
New London	1 50	1 65	1§0@2	1 00
Newport	1 50	1 65	2 10	1 00
New York	85††	1‖ 55	1. 80	40
Norfolk, Va	85	60	60	....
Norwalk	85‡	1 50	....	80
Norwich	1 50‡	1 90	....	1 00
Pawtucket	1 75‡	1 90	2 20	....
Philadelphia	....	1 00	....	....
Portland	1 95	2 00	2 50	1 60
Portsmouth, N. H.	2 05@2 10	2 20	2 75	2 10
Providence	1 50	1 60	2 10	1 00
Petersburg, Va	....	90	....	....
Portsmouth, Va	....	....	....	....
Poughkeepsie, N. Y.	....	1 50	....	....
Richmond, Va	1 00	70	....	....
Rockport	....	....	....	....
Saco	2 50	....	....	....
Sag Harbor	....	....	....	1 00
Salem, Mass	2 00	2 20	2 60	2 05
Salisbury Pt., Mass	....	....	....	...
Savannah, Ga	....	1 50	....	....
Stamford	*85	....	....	90
Stonington	....	....	....	....
Taunton	.. .	..	....	....
Trenton, N. J.	....	....	....	....
Troy	...	....	....	....
Warren, R. I.	....	....	....	1 00
Washington, D. C.	1 00	....	....	....
Wareham	....	1 75	....	....
Weymouth	2 00	2 00	2 60	....
Wilmington, Del	....	1 00	....	....
Wilmington, N. C.	....	1 50	....	....

* And discharging and towing. † And discharging. ‡ And towing. § 3c. per bridge extra. ‖ The rate to this point by barge is $1 70.

Freights on Bituminous Coals from the Mines to Tide-Water Shipping Ports.

From the Mines to Cumberland and State Line (say an average of 20 miles) the charge is 3 cents per ton of 2240 lb. per mile.

From State Line to Amboy (346 miles) $3 75 per ton of 2000 lb. On coal shipped beyond this point there is a drawback of 50 cents per net ton.

From Cumberland to Baltimore (178 miles) $2 31 per ton of 2240 lb., or $2 02 per net ton, and 4 cents per gross ton for use of cars.

From the Mines to Piedmont (from 4 to 10 miles) 5 cents per ton of 2240 lb. per mile on distances less than 5 miles, and 4 cents per ton per mile on distances not over 10 miles.

From Piedmont to Baltimore (206 miles) $2 69 per ton of 2240 lb., or $2 40 per net ton.

From any point in the Kanawha Valley to the James River wharves below Richmond, (say 350 miles) by C. and O. R.R., including terminal charges, per ton of 2240 lb. For Cannel coal, $4 50.

Do. do., for Semi-Cannel or Splint, per ton of 2240 lb., subject to rebate on shipments of 5000 tons or more, $3 65.

From Irwin to W. Phila. (say 332 miles) per P. R R. Penn. Westmoreland gas coal, per ton 2000 lb	$4 75
From Osceola to W. Phila. (say 248 miles) per T. & C. R. R., per ton bituminous coal of 2000 lb., &c. extra for cross roads. Drawbacks, according to destination of coal	3 50
From Fairmount and Clarksburg to Baltimore (say 300 miles) via B. & O. R. R. including loading, per 2000 lb	4 75
On through coal after deducting drawback	....
From Richmond, Va., to New York, via vessel, 392 miles per 2240 lb.	1 60
" " " *Boston*, about 650 " " "	2 00
" " " *Philadelphia*, 292 " " "	1 25
From the Mines to Richmond, via James River and Kanawha Canal, 15 miles	15

IRON MARKET REVIEW.

New York.

FRIDAY EVENING, Jan. 28, 1876.

American Pig.—We are reported sales of 2000 tons of No. 2 foundry to a pipe works at $21, and about 3,000 tons of Nos. 1 and 2 foundry, for general consumption, at $23 and $21, respectively—all Thomas iron. With this exception, we learn of no business worthy of note, although we have been shown numerous letters of inquiry asking prices for fair lots. There is nothing at present to indicate either higher or lower prices. We quote No. 1 foundry at $23; No. 2, $21; and forge $18@$20.

Scotch Pig.—This article is in very reduced demand; sales being almost entirely confined to very small lots; which, however, appear sufficient to prevent accumulation of stock. We quote Coltness at $32 50@$33; Eglinton, $29 50@$30; and Glengarnock, $31.

Rails.—We are reported a sale of 500 tons iron, on private terms. The inquiry is not so great as it was a short time back. We quote iron, at the mills, at $45, and steel, $62@$65.

Old Rails.—We are reported no further business, and give as our quotation the price at which the last sale was made, viz., $21.

Scrap.—There is nothing doing in this article, which we quote at $30@$31.

Philadelphia, Pa.

Weekly report of the Philadelphia Iron Market, furnished by Messrs. JUSTICE COX & Co., Iron Merchants, 333 Walnut street Philadelphia Week ending Jan. 27, 1876.

The inquiries since our last have been good, with many small sales for immediate wants. In forge or mill iron the demands have been quite large, and several large sales (for the times) have been made; in two cases, at a little advance over last week's quoted prices. The feeling for both forge and foundry irons is to a stronger market if not to higher prices. The impression seems to gain ground that bottom prices have been reached, hence the inquiry for lots to run into the summer. The mills are fairly busy on orders, but at such ruinously low prices that mill men say they would as leave stop as run at the prices. We report sales of 500 tons Forge, Montgomery, $21, here; 100 tons No. 1 Montgomery, $23.50; 100 tons No. 1 St. Charles, $23.50; 500 tons Chickies, private terms; 1000 tons Crane Forge, private terms; 200 tons No. 1 Crane, $23.50. We quote No. 1, $23@23.50; No. 2, $21@21.50; Gray Forge, $20@21.50.

New Iron Rails, $42@46.
Old " " $24@25.
Steel Rails, $65@67.

Report sales of 100 tons light rails for narrow gauge road.

Baltimore. Jan 26, 1876.

Specially reported by Messrs. R. C. HOFFMAN & Co.

The pig iron market continues dull; transactions light without change in prices. We quote:

Baltimore Charcoal	$32@35	Anthracite No. 3	$21@22
Virginia Charcoal	28@34	Mottled and White	17@19
Anthracite No. 1	24@25	Charcoal C. B. Blooms,	70@75
" No. 2	23@24	Refined Blooms	60@65

Boston. Jan. 22, 1876.

PIG presents no features of interest differing from the tenor of the reports of the past six weeks. There is a very listless feeling among buyers, and some considerable uneasiness with holders. The quotations are entirely nominal, and follow the prices of the primary mar-

kets, hardly commensurate with the distances and the cost to land. The latest New York quotations are for No. 1, $22.50@23; No. 2, $21@21.50; and gray forge, $15@19. This market reports nominally at $19@26, with no business.

BAR has had a fair average week. The market price, $51.50, varies in its tone almost daily, and a very careful canvass fails to convince that the chances for a 50c. advance are any more cheering than the expectations of a further 50c. decline. The auction of MOSELEY, HODGMAN & Co.'s stock, while showing unexpectedly low prices, and seemingly marking an indisposition with dealers to stock up at lower figures, has been over-estimated in its importance in this direction. The idea was prevalent when the sale opened that there was a good deal of common iron in the stock, and, notwithstanding the auctioneer was very certain in his assurances that the lots that represented refined iron were honestly of high grade, still the suspicion lurked about and really influenced the prices bid.

The first lot, 19,690 lb., ordinary flat, was bought by DAVIS, FURBER & Co., at 2 1-16c. The next three lots of ordinary sizes and and extras, by BACON & BROWN; two going at 2 1-16c. and one at 1⅞c. The same bidding secured lots 8 and 10 at 2 1-10c, and 11 at 2 5-100c., DODGE & GILBERT took in lots 5 and 9 at 2 1-10c. Lot 6 went to the Old Colony Railroad, and 7 to MCCANN & BARNES at 2 1-10. Lot 12, shafting, at 2 1-10c., was a bargain to PRATT & INMAN, of Worchester. Lot 13, all rods, was taken by BOYD & MCCLURE at 2 3-10c. Lot 15, 39,000 lbs. of hoops, was bought by JOYCE & RICHARDSON at 3 3-10c. Lot 16, say 8 tons bands, was secured by BACON & BROWN at 2 35-100c. There was a large attendance of buyers, mostly local, however. The gossip of the occasion, after discussing low prices, etc., settled in a good deal of wonderment on the plate-iron enterprise, and in another store which BACON & BROWN had inaugurated.

STEEL is moving in a small and steady way, with a little irregularity in prices; more noticeable on machinery and agricultural than in other lines.

We quote American tool, 14@15c.; American machinery, 9@9½c.; Bessemer tires, 6¾@7¼c.; SWEET'S excelsior tire, 8½@12c.; English tool, 17@18c., gold.

COPPER is dull and easy, at 23c. to 23⅜c.—a trifle off on the extremes from last week's quotations. These concessions are made more in the hopes of inducing buyers than of any really weakening feeling in the combination. Business of any degree of activity would influence their returning to higher quotations.

For manufacturers we quote new sheathing 30c.; for bolts and braziers, 31c.; yellow metal bolts, 20@29c.

LEAD is quiet and steady.

We quote pig 6c. for domestic and 6½@6⅝c. for foreign; sheet and pipe lead, 9c., currency; tin-lined pipe, 16½c.; bar lead, 9c., less usual trade or 10 per cent. discount.

ANTIMONY is firm, with a small inquiry at 13½c.

SPELTER is strong and quiet at $7.45, 30 days, and $7.35, prompt cash, all currency. Silesian is dull at $7.75.

TIN is without change, and stocks are held with considerable ease both in pig and plates.

We quote Straits 19@19½c.; Banca, 23½@24c.; Refined English 19@19¼c., gold. We quote plates charcoal I. C., $7.50; coke, $6.75@7; and terne at $6.30@6.75, gold.—*Commercial Bulletin.*

Cincinnati. Jan. 25, 1876.

Specially reported by MESSRS. TRABER & AUBERY, commission merchants for the sale of pig iron, blooms, ore, etc.

Below will be found closing quotations of our Pig Iron market.

CHARCOAL.

Hanging Rock, No. 1 Foundry	$25 00@	....	—4 mos
" No 2, "	23 00@24 00		—4 mos
" Mill	22 00@	....	—4 mos
Tennessee No. 1, Foundry	23 00@24 00		—4 mos
Tennessee, No. 2, "	22 00@23 00		—4 mos
" Mill	22 00@	....	—4 mos
Missouri, No. 1, Foundry	@	....	—4 mos

STONE COAL.

Ohio, No. 1, Foundry	22 00@23 00		—4 mos
" No. 2, "	21 00@22 00		—4 mos
Ohio Mill	20 00@21 00		—4 mos
Missouri, No. 1 Foundry	27 00@	....	—4 mos
" No. 2, "	26 00@	....	—4 mos
" Mill	26 00@	...	—4 mos

CAR-WHEELS.

Hanging Rock, C. B.	40 00@50 00		—4 mos
Tennessee "	30 00@35 00		—4 mos
Missouri "	35 00@40 00		—4 mos
Alabama "	30 00@35 00		—4 mos

BLOOMS.

Charcoal	60 00@ 75 00	—cash

SCRAP IRON.

Cast	50c.@ 65	—cash
Wrought	90@1 10	—cash

Chicago. Jan. 25, 1876.

Specially reported by Messrs. ROGERS & Co., dealers in

The following are the present quotation for pig metal in our market:

Scotch and American pig iron.

No. 1 Coltness	$38 00@	....	
No. 1 Gartsherrie	38 00@	....	
No. 1 Summerlee	37 00@	....	
No. 1 Glengarnock	36 00@	....	
No. 1 Eglinton	35 00@	....	
Warner's "American Scotch"	30 00@	....	
Massilon No. 1 Foundry	29 00@	....	
No. 1 Grand Tower Mo. ores (Bituminous)	29 00@	....	
No. 2, " " "	28 00@	....	
No. 1 Mill	25 00@	....	
No. 1 Foundry, Ohio	28 00@	....	
No. 2 "	27 00@	....	
No. 1 Hanging Rock (charcoal)	28 00@	....	
No. 2 " "	26 00@	....	
Union "A" 1 (Anthracite)	28 00@	....	
Union "B" 1 (Anthracite)	26 00@	....	
No. 1 Lake Superior (charcoal)	28 00@	....	
No. 2 Lake Superior "	26 00@	....	
No. 3 Lake Superior "	26 00@	....	
No. 4 Lake Superior "	28 00@	....	
Bessemer Steel Rails	65 00@	....	
New Iron Rails	45 00@	....	
Old Rails	28 00@	....	

Cleveland, Ohio. Jan. 25, 1876.

Messrs. C. E. BINGHAM & Co., quote as follows:

Per gross ton, on four month's time. Subject to change in market. Discount for cash 4 per cent.

FOUNDRY IRON.

No. 1, Lake Superior Charcoal	28 50@	....
No. 2, " "	28 00@	....
No. 1, Anthracite	26 00@	....
No 2, "	24 50@	....
No. 1, Bituminous foundry	26 00@	....
No. 2, " "	24 50@	....
American Scotch, No. 1, Cherry Valley	29 50@	....
" " B—1, " "	27 50@	....
" " No. 2, " "	26 00@	....
No. 1, Massilon	28 00@	....
B—1, "	26 00@	....
No. 2, "	23 00@	....

CAR WHEEL AND MALLEABLE IRON.

No. 3 Lake Superior Charcoal	27 00@	....
No. 4 " " "	28 50@	....
Nos. 5 and 6 " "	29 00@	....

BESSEMER IRON.

Nos. 1 and 2 Lake Superior Charcoal	28 00@	....

FORGE IRON.

No. 1, Gray	23 00@	....
White and Mottled	22 00@	...

Indianapolis, Ind. Jan 25, 1876.

Specially reported by NELSON KINGMAN, broker and dealer in pig iron, etc.

Prices remain the same.

Trade very dull at prices named below.

New Rails at mill	$48 00@50 00		
Old Rails "	24 00@26 00		
Hanging Rock Charcoal Pig No. 1 foundry	28 00@29 00	—4 mos	
" " " " " 2 "	26 00@28 00	—4 mos	
" " " Mill	24 00@26 00	—4 mos	
Car Wheel C. B.	40 00, nominal.		

STONE COAL.

Indiana No. 1 Foundry pig Red Short	24 00@26 00	—4 mos	
" 2 " " "	22 00@24 00	—4 mos	
" 1 Forge " "	@	—4 mos	
" 2 " " "	@	—4 mos	
Ohio No. 1 Foundry pig Cold Short	25 00@26 00	—4 mos	
" 2 "	24 00@25 00	—4 mos	
" Mill	23 00@24 00	—4 mos	
" No. 1 Foundry, Neutral	26 00@28 00	—4 mos	
" No. 2 " "	25 00@27 00	—4 mos	
Merchant Bar	2½c.	—3 mos	
1st quality C. H. No. 1 Boiler Plates, per lb	5 c.	—3 mos	
1st " Com. Sheet for No. 24, W.G. "	4 c.	—3 mos	
1st " Charcoal Sheet " " "	5½c.	—3 mos	
Best Bloom Galvanized Sheet, discount 20 per cent		—cash.	
2d quality " " " 30 "		—cash.	

f. o. b. in Indianapolis.

Louisville. Jan. 24, 1876.

Specially reported by Messrs. GEORGE H. HULL & Co.

The market is dull, but without change in prices.

The usual time, four mos., is allowed on the quotations below:

HOT BLAST—CHARCOAL.

No. 1 foundry, from Hanging Rock Ores	$25 00@26 00	
No. 2 " " "	23 00@24 00	
No. 1, Mill, from " "	—@—	
No. 1, foundry, from Alabama, Georgia and Tennessee ores	23 00@24 00	
No. 2, foundry, from Ala., Geor'a and Tenn. ores	22 00@23 00	
No. 1, Mill, from " " " " "	21 00@22 00	

HOT BLAST—STONE COAL AND COKE.

No 1, foundry, from Hanging Rock ores	23 00@24 00	
No. 2, " " " " "	22 00@23 00	
No. 1, Mill, " " " " "	21 00@22 00	
No. 1, foundry, from Ala. Ga. and Tenn. ores	23 00@24 00	
No. 2, " " " " "	22 00@23 00	
No. 1, Mill, " " " " "	21 00@22 00	
No. 1 foundry, from Missouri ores	24 00@25 00	
No. 2 foundry, from Missouri ores	24 00@25 00	
No. 1 Mill, from Missouri ores	25 00@26 00	

COLD BLAST—CHARCOAL.

Car Wheel from Hanging Rock ores	35 00@40 00	
" " Tennessee "	28 00@30 00	
" " Alabama and Georgia ores	28 00@38 00	
" " Kentucky ores	28 00@40 00	

Milwaukee. Jan. 25, 1876.

The pig iron market remains much the same. Prices are as follows:

per ton of 2,240 lb.

Frankfort L. S. Charcoal, No. 1	$29 00	
" " " No. 2 & 3	28 00	
" " " No. 4 & 5	31 00	
" " " No. 6	33 00	
Mil. Anthracite L. S., No. 1	27 00	
" " " No. 2	26 00	
Wisconsin Iron, No. 1	25 00	
Mahoning Valley Bit's No. 1	30 00	
" " " No. 2	28 00	

Pittsburgh, Pa. Jan. 25, 1876.

Specially reported by A. H. CHILDS, Esq.

The demand for pig iron continues moderately active, and prices firmer. There are fewer sellers at anything below quoted rates, and some having disposed of a good part of their accumulated stock, are not disposed to accept current rates for the remainder. There is still, however, a plentiful supply for cash buyers, or those of undoubted credit. Quotations are:

No 1. foundry	$25 00@26 00	—4 mos
" 2. "	23 50@24 00	—4 mos
Gray forge	22 00@23 00	—4 mos
White and mottled	20 00@21 00	—4 mos

PIG IRON.—The most important feature we have to record is an increased trade; the volume of business during the past week was the largest we have had for several months, notwithstanding the reported sales were in small lots ranging from 100 to 300 tons. As might be expected, the increased demand has stiffened up the general tone of the market, and while there has been no change in prices since the date of our last review, there has been an advance of from 50c. to $1 per ton since the 1st of the year. While it is true that some holders refused to sell at the rates prevailing in November and December, it is also true that the mills were able to obtain all they wanted, which was not very much, so that in reality, as already stated, there has been an advance, purchases cannot be made as low now as then. Good standard mill irons may now be fairly quoted at $22.50@$23, 4 mos; the most of the sales recently were at $22.50, 4 mos., whereas a few weeks ago it would have been difficult to have disposed of any quantity at over $21@$21.50, 4 mos., as it was not then wanted. The receipts, particularly by rail, are increasing, but the most of that now coming forward was sold to arrive, and is being placed on contracts, very little of it going into yard. While it is not expected, nor is it generally desired, that there will be any material advance for the present, there is no question but the general position of the market is more favorable to producers, as the consumption is increasing; stocks are comparatively light, and there is no probability of the production being increased much before spring. Foundry irons continue quiet and an increased demand for these may be looked for within the next month or two.

QUOTATIONS.

No. 1 foundry	$25 00@26 00	—4 mos.
No. 2 foundry	23 00@24 00	—4 mos.
Gray forge	22 50@23 00	—4 mos.
White and mottled	20 00@21 00	—4 mos.
Charcoal mill	23 00@24 00	—4 mos.
Charcoal foundry	27 00@30 00	—4 mos.
Cold blast car wheel, Eastern	30 00@35 00	—4 mos.
" " " Western	40 00@45 00	—4 mos.

MANUFACTURED IRON.—There is but little that is really new or important to record; trade continues much the same as noted for some weeks past, a little tame, but it usually is at this particular time, and it is expected that orders will commence to come in pretty freely within the next week or two. While it is expected that prices will rule low, and that the margin will be small, as compared with late years, there is reason to expect an increased trade this year. The South and West, which sections are dependent upon their agricultural interests, are in good condition; they cannot be otherwise, having had good crops for several years in succession, and realized remunerative prices for their products. We look, therefore, not only for an increased demand for iron, but Pittsburgh manufactures generally. Merchant bars may be quoted at $2.15@2.25, 60 days, with smaller sizes included, but an order exclusively for bars could not be placed under one or two-tenths additional.

STEEL.—There is a very fair degree of activity, but, so far as we can learn, there are no new or important features deserving of special notice. Nearly, if not all the mills here are in operation, some of them working up to their full capacity, and about the only complaint we hear, is in regard to prices, which have been cut so close as to afford a very small margin for profit.

STEEL RAILS.—As noted in our last report, all the steel rail mills are reported busy, many of them sold ahead of their production for several months; at current rates they are cheaper than iron rails, because of their greater durability. No change in prices, which may be quoted at $65 cash, delivered free on cars in Pittsburgh. The EDGAR THOMPSON STEEL RAIL COMPANY will ship on thousand tons to Johnsonville, Tennessee, about the first of the coming month.

PIG METAL SALES REPORTED FOR THE AMERICAN MANUFACTURER FOR THE WEEK ENDED JANUARY 26, 1876.

BITUMINOUS COAL OR COKE, SMELTED FROM L. S. ORE OR L. AND NATIVE.

10 tons No. 1 foundry	$25 00—4 mos.
30 tons No. 1 foundry	24 00—4 mos.
10 tons No. 2 foundry	24 00—4 mos.
700 tons gray forge	22 50—4 mos.
200 tons gray forge	22 25—4 mos.
500 tons gray forge, medium	22 00—4 mos.
200 tons gray forge N	21 00—cash.
100 tons mottled	21 50—4 mos.

CHARCOAL.

180 tons No. 1 and 2 foundry, H. R.	P. T.

—*American Manufacturer.*

St. Louis. Jan. 25, 1876.

Specially reported by Messrs. SPOONER & COLLINS, Commission Agents for all kinds of Iron.

The inquiry for iron seems to be on the increase, although prices continue to rule very low. Several good sales are reported, but at prices which hardly justifies.

Yo. Stone Coal No. 1 Fy.	$25@26	Massillon iron, A No. 1	31@32
" " " 2 "	24@25	" " B "	1.29@30
" " Gray Mill,	24@25	" " "	2.25@28
" Charcoal No. 1, Fdy.	24@25	Cold Bl. Car Wheel, Mo.	35@40
" " 2, "	23@24	" " " Tenn.	33@35
" " Gray Mill,	23@24	" " " Ala.	33@35
Tenn. " No. 1, Fdy.	24@25	" " " H. R.	32@33
" " 2, "	23@24	Mo. Charcoal Blooms	60@70
" " Gray Mill,	23@24	" Scrap "	55@60
Va. Coke, No. 1, Fdy.	25@26	" " hammered Billets	75@80
" " 2, "	24@25	Assorted Bar Iron 2 35, 90 days	
" "Gray Mill,	23½@24½	No. 1 Wrought Scrap	10 ch.
H. R. Char. No. 1, Fdy.	26@27	Heavy cast "	95 "
" " 2, "	24@25	Light " "	60 "
" " Gray Mill,	24@25		

Richmond, Va. Jan. 25, 1876.

Reported by ASA SNYDER, Esq.

Charcoal irons continue firm; some brands have advanced. Receipts are light. We quote:

Virginia Cold Blast Charcoal Pig Iron					$27 to $33
" Warm " "			"	"	24 to 28
" " " Coke			"	" 1 X	24 to 25
" " " "			"	" 2 X	22 to 23
" " " "			"	" 3	21 to 22
" Anthracite 1 X					25 to 26
" " 2 X					23 to 24
" " 3					22 to 23

METALS.

NEW YORK, FRIDAY EVENING, Jan. 28, 1876.

There is a better feeling in the market, owing to an increased business, which has given more firmness to some articles.

Gold Coin.—During the week past gold has ranged from 112⅞@113⅛, and closed at 113.

Bullion.—Fine silver bar is quoted at $1 20@$1 21, gold, per ounce, and fine gold bar at par ($20 67, gold, per ounce,) to ¼ per cent. premium.

Copper.—There has not been quite so much doing this week as last. We are reported sales as low as 22¾c., although the general asking price is 23@23¼c. The market appears to be somewhat unsettled.

Tin.—This article is attracting more attention and shows greater firmness, under an increased business and higher prices in London. We quote Straits, in lots of 500 to 1,000 pigs, at 18⅛c., and in lots of less than 100 pigs, 18¾c.@19c.; L. and F., in five ton lots, 18c., and in lots of one ton 18⅛c.@18½c.; Refined, 18½c.@18⅝c.; and Banca, 23c., prices all gold. Cable advices of to-day quote Straits at £81@£82, in London, an advance of about £3 since the opening of the week.

Tin Plates.—There is an improved business doing in these, and prices are more firm. We quote, prices in gold, per box, as follows: Charcoal tins, $7.62½@$7.75; and ternes, $7.12½@$7.25; coke tins, $6.75, and ternes, $6.25@$6.37½.

Lead.—The business of the week has been very limited, and in small lots only. The price of ordinary Domestic is firm at about 6c., gold. Missouri soft is quoted at 7⅛c., currency, here. Foreign is nominal at 7¼c., gold

We extract the following from a review of the lead market for 1875, by EDWARD CASWELL, etc.:

"The lead business of the country must have been at least five per cent. less than in 1874, and as the normal increase with the growth of any people is usually from five to ten per cent. annually, the diminution should in reality be calculated as being from ten to twelve per cent. The supply for the year has been about five per cent. less than last year, so that the decrease in consumption has just counterbalanced the decrease in supply. Our United States production, however, has increased 6,500 tons, being from 46,500 to 53,000 long tons, or fourteen per cent. The decrease in supply has come from reduction in importations and Government sales."

This report was received by us too late for publication this week. We shall give it further notice at a future time.

Spelter and Zinc.—Domestic spelter continues very quiet, and the price, so far, unchanged from 7·60c. currency, 30 days. It is rumored, however, that the combination at a meeting on Tuesday, resolved to advance the price; although it is unknown here what action was taken. Foreign is quoted at 7·30@7·50c. gold, with a little offering at 7·25@7·37½c. gold. Sheet zinc is quoted at 8⅜@9c., gold.

Antimony, is quiet at 14c., gold.

Quicksilver shows a decline, prices being as follows: in this city, per lb., 65c.: San Francisco, 60c.; and London, per bottle of 75 lb., £9 17/.

FINANCIAL.

New York Stocks.

FRIDAY, Jan. 28, 1876.

The stock of the Central R.R. Company of New Jersey continues to advance; our quotations being about 1½ per cent. higher than a week ago. Sales of this stock for the week, aggregate some 3,000 shares. St. Louis and Iron Mountain R.R. is firm at a fractional advance, with sales of 2,500 shares.

Mariposa Land and Mining Company is firm and quiet; the tunnels are 1,390 feet in length, and the vein, which is gradually growing larger, is now between four and five feet in thickness. The diamond-pointed drills have been running successfully for nearly a week.

Bonds are fairly active with quotations barely maintained. The Joliet Iron and Steel Company will hold their annual meeting at Chicago, on Feb. 9th.

The Coos Bay (Oregon) Coal Company of San Francisco, have levied an assessment of 75c. per share.

We note the following recent sales of various securities in the Baltimore stock market: $11,000 Pittsburgh and Connellsville R.R. 1st mortgage 7s., at 103 to 105¾; $3,500 Chesapeake and Ohio Canal preferred bonds, at 115, and 1,600 shares of the Atlantic Coal Company's stock, at $2 45 to 2 50.

Quotations and Sales of Stocks and Bonds,

For the week ending Jan. 28, 1876.

STOCKS.

	Highest	Lowest	Closing	Shares sold.
Pennsylvania Coal Co	—	—	†280½	—
Consolidation Coal Co	49¾	49⅛	49½	1211
Spring Mt. Coal Co	—	—	63	—
American Coal Co	—	—	55	100
Maryland Coal Co	—	—	18	—
Del., Lack., and West. RR. Co.	118½	117⅝	118⅜	3779
New Jersey Central RR. Co.	107¼	105⅛	107	2999
Delaware and Hudson Canal Co.	120⅝	120	120	167
Quicksilver Mining Co. pref'd	—	—	24⅝	—
" " Common	18	17⅞	18	200
Mariposa Land & Min. Co. various.	8¼	8	8¼	400
St. Louis & Iron Mountain RR.	21¾	19¼	20	2500
Lehigh & Wilkes-Barre Coal Co.	—	—	40	—
				—

Total Shares sold 11356
Sales for the week previous 9136
Increase 2220

† Nominal.

BONDS.

	Sales.	Price
Ches. & O. R. R. 6s, 1st, coupon	36,000	30 @ 32
" " " ex coupon	—	@ 26¾
Central RR. of N. J. 1st Mtg. N.	5,000	@115½
" " " 1st Cons.	20,000	108 @109
" " " Convt.	30,000	107¼@107¾
Del. and H. Canal, 1st Mtg. 94'	5,000	@113
" " 78, '77	—	@102
" " Reg. '91	—	@111½
Del., Lack. & W. R. R., 7s, conv.	—	@110
" " " " 2d Mtg.	—	@118
St. Louis & Iron Mount'n 1st Mtg	5,000	@ 99¾
St. Louis & Iron M'tn, 2d Mtg.	—	@ 62½
Lehigh & Wilkes-Barre Cons.	1,000	@ 97
Total Sales	$102,000	

Closing quotations, in the absence of sales, represent the latest prices bid.

Philadelphia Stocks.

PHILADELPHIA, Jan. 28, 1876.

The Philadelphia stock market has been very active during the week, the transactions footing up over 80,000 shares, of which some 60,000 shares represent the sales of Pennsylvania R.R. This stock has advanced about one per cent., and closed firm at within a fraction of the highest quotation of the week. Reading R R. stock has been moderately active, with quotations generally steady. We note an advance of one per cent. in the stock of the Lehigh Valley R.R. Company, with moderate transactions, the stock closing at the highest quotation of the week.

At the recent meeting of the stockholders of this company, the annual report for the year 1875 was read, from which we make the following extracts:

The almost universal suspension of labor in the coal regions tributary to our road, which began about January 1, and continued for more than six months, had the effect of reducing to a considerable extent the business of the past year. Of our total anthracite coal tonnage, 1 939,296 tons were carried during the last four months, showing a capacity for a yearly tonnage of nearly six million tons, with our present equipment.

Our total anthracite coal tonnage for the past fiscal year, as compared with 1874, was:

1875	3,277,572 tons.
1874	4,150,660 "
Being a decrease in 1875 of	873,088 "

In addition we carried of bituminous coal:

In 1875	55,900 tons.
In 1874	26,522 "
Being an increase of	29,278 "

Showing total coal tonnage of:

In 1875	3,333,472 tons.
In 1874	4,177,282 "
A net increase of	843,810 "

The receipts from all sources (including interest from investments, net income from coal lands, etc.) amounted to	$7,318,067 68
Operating expenses of road	3,262,861 97
Net income	$4,055,205 71

While the gross income has fallen off $18,899 42 from that for 1874, the operating expenses have been reduced $208,556 44. After charging all our expenses, interests on bonds, and dividends, the business of the year shows a loss of $93,053 56, which has been taken from our reserve fund. The usual quarterly dividends, amounting to 10 per cent. per annum, have been paid on the preferred and common stocks.

At the close of our fiscal year (Nov. 30, 1875) our capital account was as follows:

Preferred and common stocks (including scrip installments)	$27,092,297.50
Registered and mortgage bonds	22,129,000·00
Total	$49,221,297·50
Floating debt, less cash on hand	none.

It will be observed that a considerable increase has been made since last report in both our stock and bond accounts. This was done by the negotiation on satisfactory terms of bonds issued under our consolidated mortgage, and by the issue of additional stock, *pro rata*, among our stockholders at par made in April last. The funds so provided have been applied to the completion of the Easton and Amboy Railroad, the purchase of securities of companies owned or controlled by us, including Morris Canal bonds, due April 1st, next, and for additional equipment, etc.

The first and second mortgage bonds of the Morris Canal and Banking Company, amounting to $785,000, become due on April 1, next. As lessees of the works of that company they will be paid by us at maturity, upon their presentation. In order to replace these securities in accordance with the terms contemplated by the lease, the Canal Company will create a new mortgage for $1,000,000, to cover these bonds, and also their Boat Loan.

The Easton and Amboy Railroad was opened for business about the 1st of July last, as the New Jersey Division of our road. To the end of our fiscal year we had expended upon its construction, etc., $8,534,689·99. The transportation receipts from that branch to the same period, being for about five months, amounted to nearly $550,000.

On the 11th of October last the Perkiomen Branch of the Reading Railroad, connecting with our road, near Allentown, was opened, making a new outlet for Philadelphia business.

The Pennsylvania and New York Canal and Railroad Company, notwithstanding the prostration in the coal business with which it also had to contend, has been quite successful, and the result of its business for the year is very satisfactory.

No change has been made since last report in our interest in coal lands. These investments have, of course, not been as remunerative as in a year when the business was more regular. There were mined during the year just closed 1,536,314 tons of coal from lands owned or controlled by us.

The total road receipts and expenses for the year are shown below:—

FROM TRANSPORTATION OF COAL.

	Gross.	Expenses.	Net Receipts.
Coal	$4,425,009.86	$2,038,178.55	$2,386,831.31
Freight	1,101,356.47	826,606.46	274,750.01
Passenger, express & mail.	520,129.11	398,076.96	122,052.15
Total 1875	$6,046,495 44	$3,262,861.97	$2,783,633.47
Total 1874	6,759,391.02	3,471,418.41	3,287,972.61
Decrease	$712,895.58	$208,556.44	$504,339.14

The superintendent's report was read. It states that the decrease of tonnage east of Mauch Chunk during the year was 598,836 tons, or 19·85 per cent. The amount of coal delivered to furnaces and mills upon the line shows a falling off of over 90,000 tons from 1874. The miscellaneous freight transported amounted to 1,668,783 tons, and the total number of passengers carried was 1,068,664, a decrease from 1873 of 100,537. The receipts from this source fell off $14,334.70. The total length of track in use by the road is 463·52 miles, of which 128·21 miles are steel rails.

The following officers were elected to serve for the ensuing year: President, ASA PACKER; Directors, CHARLES HARTSHORNE, WILLIAM W. LONGSTRETH, J. GILLINGHAM FELL, WILLIAM H. GATZMER, DAVID THOMAS, ASHBEL WELCH, WILLIAM L. CONYNGHAM, ARIO PARDEE, WILLIAM A. INGHAM, JOSEPH WHARTON, GEORGE B. MARKLE, ROBERT H. SAYRE.

The first and second mortgage bonds of the Morris Canal and Banking Company, due April 1st, 1876, will be purchased at par and interest, or exchanged for our Registered Consolidated Mortgage Bonds at 97½ and interest.

L. CHAMBERLAIN,
Treasurer Lehigh Valley RR. Co.

Messrs. HENRY S. KING & Co., London, invite subscriptions for £150,000 in bonds of the Utica, Ithaca and Elmira Railroad Company. The interest is stated to be £7 3/ per annum, and the bonds are to be issued at 7½ per cent. discount. They form the remainder of a loan for £300,000, half of which is said to be already placed. This company is a consolidation of the "Ithaca and Cortland" and the "Utica Horseheads and Elmira Railroads," and includes in all 130 miles. The entire line will be open in July, and its traffic, it is supposed, will be largely from anthracite coal furnished to it by the larger coal carrying companies of Pennsylvania. The London *Times*, in noticing this offer, says: "It is a pity that the bonds were not issued under some good guarantee, as the English public are slow to invest in small lines of this kind whose share capital is less than the bonded debt." This is a hint, that may, perhaps, be observed by other parties looking for loans in foreign markets. It is desirable to have a good guarantee, and it is almost of equal importance to have the negotiation in the hands of some American house of established credit having foreign branches.

The Diamond Coal Company announces a dividend of 2 per cent., payable on demand.

The annual meeting of the stockholders of the Delaware Division Canal Company will be held at their office, on Tuesday, February 1st, 1876, at 12 o'clock m., when an election will be held for managers for the ensuing year.

The annual meeting of the stockholders of the Huntingdon and Broad Top Mountain Railroad and Coal Company will be held at their office, on Tuesday February 1, 1876, at 12 o'clock m., when an election will be held for President and Directors for the ensuing year.

The annual meeting of the stockholders of the St. Nicholas Coal Company will be held on Monday, February 7, at 12 o'clock, m., at which time an election will be held for seven directors to serve for one year.

The annual meeting of the stockholders of the Tremont Coal Company and an election for President, and six Directors to serve for the ensuing year, will be held at the office of the company on Tuesday, Febuary 1, at 12 o'clock, m.

We note the following sales at auction during the week $10,000 of the bonds of R. C. and I. Company Genthworth tract at 90, and $50,000 of the Brady tract at 87; also $7,000 Philadelphia and Reading Railroad new convertible 7 per cent. mortgage bonds at 105 to 105¾.

Also 8 shares of the Logan Iron and Steel Company at $28 per share.

Quotations and Sales of Stocks and Bonds.

For the week ending Jan. 28, 1876.

STOCKS.

	Highest	Lowest	Closing	Shr's
Lehigh Valley RR. Co	63⅜	62⅝	63¾	885
Pennsylvania RR.	56¼	55	55¾	60750
Reading RR.	53⅜	52¾	53⅜	13601
Lehigh Coal and Nav. Co	51¼	51	51⅛	7343
Penn. Canal	—	—	9	—
Buck Mountain Coal Co.	—	—	—	—
Fulton Coal Co.	—	—	3¼	—
Locust Mountain Coal Co	—	—	—	—
Westmoreland Coal Co.	—	—	80	—
St. Nicholas Coal Co.	—	—	1	—
Cambria Iron Co.	17	16⅝	17	762
Crane Iron Co.	—	—	46	—
Emaus Iron Co	—	—	—	—
Pennsylvania Salt Manufact. Co.	78	77	78	51

Total shares sold 83,392
Sales for the week previous 61,881
Increase 21,511

BONDS.

	Sales.	Price
H. and B. T. RR. 1st mortgage, 78	—	@108
" " " 2d " "	6,000	104½@105
" " " 3d " cons	22,000	63 @ 64
Lehigh Valley RR. Con. mtg. 6s, Reg	11,000	98 @ 98¾
" " 7s, 1910	5,900	112½@113
" " 6s reg. and cou.	1,000	— @106½
Pennsylvania RR., 1st mtge. 6s	—	—@†104¾
" gen. " cou. 1910	3,000	101½@102
" " gen. " 6s, reg	4,000	104 @104¼
" " Cons. M. 6s Reg	100,000	— @ 97⅝
Phil. & Reading RR. 7s '93	—	—@110
" " "G. M. 7s, reg. & cou.	5,000	—@106½
" " " Deb. 6s	—	— @ 80
" " new convertible 7s	56,500	105 @106
Phil. & Reading C. & I. Co. Deb. 7s	6,000	83 @ 83¼
" " Sham. & Bear Valley tract	13,500	— @ 95
" " Mtge. 7s	1,000	— @ 90
Lehigh Coal & Nav. Co., 6s '84	1,225	103½@104
" " " RR., '97	300	—@104¾
" " " Con m. 7s	—	—@102
" " " Convt. gold, '97	17,500	103½@105
Penn. Canal, 6s	—	— @ 70
Penn. and N. Y. Canal, 7s	1,000	—@108
Ches. and Del. Canal, 6s	—	— @ 88
Susquehanna Coal Co. 7s	—	— @ 85
Buck. Mount Coal Co. 6s	—	— @ 97¾
Penn. Gas Coal Co. 6s	—	—@100¼

Total amount of sales $254,925

Closing quotations, in the absence of sales, represent the latest prices bid.

^ Asked.

Gold and Silver Stocks.

NEW YORK, Jan. 28, 1876.

With but few exceptions, mining shares have advanced on prices reported in our last. The market, during the week, has been very irregular, and quotations tend downward.

A sale of 480 shares, delinquent stock of the Bank of California, was made at auction during the week at from $14 50 to $16, assessment of $10 paid. The assessments on all the remaining stock have been paid up.

It is reported that the Sierra Nevada mine is to be cut up into four claims of 600 feet each, to be named, respectively, Sierra Nevada, Mackay, Edginton and Meredith, divided into 100,000 shares each.

The Sutro Tunnel at last advices was in 11,922 feet.

The *San Francisco Stock Report*, of Jan. 21, says:

"There were 180 stocks dealt in at the San Francisco Board last year, and the total sales foot up 8,287,000 shares, California leading off with 537,000 shares, equal to the entire capital stock, and Ophir and Mexican following with 409,000 and 344,000 shares respectively. During 1874 the aggregate sales were 10 520,000 shares, Ophir leading off with 847,000 shares, and Belcher and Overman following with an average of 360,000 shares apiece. The sales of the San Francisco Stock Board for the past four years compare as follows: 1872—$189,900,000; 1873—$146,400,000; 1874—$260 500,000; 1875—$320,200,000."

QUOTATIONS:

	No. of shares.	Jan. 20.	Jan. 27.
Sierra Nevada	100,000	$21	23
Union Consolidated	100,000	12	10
Mexican	108,000	20	20
Ophir	108,000	56	64
California	540.000	86	89
Consolidated Virginia	108,000	435	447
Best & Belcher	100,800	56	65
Gould & Curry	108,000	20	24
Savage	112,000	20	24
Hale and Norcross	16,000	64	65
Chollar Potosi	28,000	90	95
Alpha Consolidated	30,000	23	21
Imperial	100,000	9	9
Yellow Jacket	24,000	95	95
Kentuck	30,000	13	13
Crown Point	100,000	24	24
Belcher	104,000	32	34
Overman	38,400	60	67
Caledonia	20,000	28	32
Justice	105,000	26	28
Raymond & Ely	30,000	26	20
Meadow Valley	60,000	3	3
Eureka Consolidated	50,000	16	16
Eureka G. V.	20,000	3	3
Silver Hill	54,000	11	11
Julia	110,000	16	16

Copper Stocks.

Specially reported by Messrs. WILSON W. FAY & Co., Bankers and Brokers, room 7 Traveller Building, 31 State street, Boston.

BOSTON, THURSDAY EVENING, Jan. 27, 1876.

The market closes to-night dull on a very limited business. Allouez is stronger at 20¼ bid. Calumet and Hecla has made a notable advance from 168 div. on to 170 ex. div. of $5.00 per share. Copper Falls is stronger at 3¾ bid, sales being effected to-day at $4.00. Duncan Silver is very steady and quiet at 160 bid, with sales at 1⅝. National is firm at 3 1-16 bid. The Quincy Mining Co. has declared a dividend of $5.00 per share, payable Feb. 15, to stockholders of record Jan. 29. Sales were made to-day at 46⅛, 46¾, and 47, and closes at 46 bid. There is nothing doing on the rest of the list to call for any special comment. Eastern has been remarkably steady fluctuating only from 13 to 13¼.

The product of the Cliff mine for 1875 was 824½ tons, or about 124 tons more than the yield of 1874.

The Phoenix returns a product for 1875 of 964 tons, an excess of about 81 tons over the product of 1874.

DESCRIPTION.	Par Value.	No. of Shares.	CLOSING. Bid.	Asked.
Allouez	$50	20,000	$20 50	$21 00
Calumet and Hecla	20	80,000	169 50	170
Central	25	20,000	35 00	35 50
Copper Falls	25	20,000	3 75	4 00
Dana	25	20,000	15	18
Duncan Silver	20	60,000	1 60	1 65
Franklin	25	20,000	14 50	15 00
Humboldt	25	20,000	25	30
Madisca	25	20,000	25	30
Mesnard	25	20,000	63	70
Minnesota	25	20,000	2 50	3 00
National	15	20,000	3 08	3 25
Petherick	25	20,000	55	62½
Pewabic	25	20,000	5 50	6 00
Phenix	25	20,000		
Quincy	25	20,000	46 00	47 00
Ridge	25	20,000	6 50	7 00
Rockland	25	20,000	35	37½
International Silver	—	—	21	25
Star	25	20,000	30	37½
Superior	25	20,000	17	20
Eastern RR.			13 25	13 50

Gas Stocks.

NEW YORK, Jan. 28, 1876.

Gas stocks are quiet and without change. 120 shares of the stock of the New York Gas Co. have been sold during the week at the New York Stock Board, within the limits of our quotations. The following were sold at auction during the week: $3000 of the Peoples of Brooklyn, 7 per cent., reg. certificates at from 83¼ to 84; also $1000 of the reg. certificates of the Williamsburgh Gas Co. at 104¼.

The Harlem Gas Co. has declared a semi-annual dividend of 4 per cent., payable February 7th.

The East Boston, Mass., Gas Co. has declared a dividend of 5 per cent., payable on demand. We note sales of 150 shares of the Peoples Gas Co. of Baltimore, at from 26¼ to 26½.

A bill was passed by the New Jersey State Assembly, on the 26th inst., preventing gas companies from collecting rent for meters.

The San Francisco Gas Co. have declared their regular monthly dividend of ¾ per cent. We note a sale of 610 shares of the stock of this company at 95.

The Southbridge, Mass., and Dorchester, Mass., gas companies have declared dividends of $3.50 and $3 per share, respectively, payable on demand. Sales of 5 shares of the stock of the Boston Gas Co. are reported to us at 780. per share, also 6 shares of the Salem, Mass. Gas Co. at 116.

The following list of Companies in New York and vicinity are corrected weekly by GEORGE H. PRENTISS, Broker and Dealer in Gas Stocks, No. 30 Broad st., N. Y.

Quotations "bid" and "asked" of New York City and Vicinity Gas Companies are on the $100 of stock and not on one share.

Companies in New York and Vicinity	Cap. Stk.	Par.	last Divid.	When Paid.	Bid.	Askd.
			pr.c			
Mutual, N. Y.	$5,000,000	$ 100	2½	Oct. '75	109	110
" " Bonds	900,00	1,000	1¾	Aug. "	105	107¾
NewYork, "	4,000,000		5	Nov. "	150	152¼
Metropol. "	2,500,000	100	5	Sept. "	160	161
" " Certf.	1,000,000		3½	" "	104	105
" " Bonds	500,000	1,000	3½	July, "	105	
Harlem "	1,850,000	50	4	Aug. "	133	138
Manhattan "	4,000,000	50	5	July, "	303	306
Brooklyn, B'klyn	2,000,000	25	5	Nov. "	210	220
Nassau "	1,000,000	20	4	July, "	110	120
" " Certf.	700,000	1,000	3½	Nov. "	101	102
People's "	1,000,000	10	3½	July, "	80	90
" " Certf.	300,000	1,000	3½	July, "		95
" " Bds	325,000		3½	Aug. "		100
Metropol. "	1,000,000	10	3½	May, "	90	97
Wmsburgh "	1,000,000	50	5	July, "	150	155
" " Certf.	1,000,000		3½	July, "	100	101
Citizen's "	1,200,000	20	2½	Oct. "	116	120
" " Certf.	320,000	1,000	3½	Oct. "	100	101
J. C. & Hob'n. N. J.	386,000	20	5	July, "	160	170
Centl. Westch. N. Y.	466,000	50	4	July, "	100	105

‡ Gold.

Companies out of Town.†	Cap. Stk.	Par	Bid	Askd.
People's " " of J. C.			130	136
Citizen's G. L. Co., Newark, N. J.	1,000,000		70	75
Hempstead " " L. I., N. Y.	40,000	100		100
Jamaica, " " " "	25,000	100		100
Richmond Co., S. I. "	300,000		100	105
Citizens', Rochester, "		100	60	68
Rochester Gas Co., "		100	50	
People's G. L. Co. Albany, "	1,000,000	100	31	40
Mutual " Buffalo "	750,000	100	55	60
Mutual " Detroit, Mich.		50	20¼	24
TroyG. L. Co., Troy, N. Y.			108	
Brockport, N. Y., G. L. Co.	25,000	100		80
Baltimore G. L. Co., Balt., Md.	2,000,000	100	185	
People's G. L. Co., Balt., Md	2,000,000	25	26¼	26⅜
Hannibal G. L. Co., Hanni., Mo.	100,000	100	95	100
La Clede, Mo				123
Lewiston G. L. Co., Lewis., Me	400,000	100	33	
Chicago G. L. Co., Chicago, Ill.	2,000,000	100	140	
Jacksonville, Ill.	120,000	100	82	
Lima, Ohio	60,000	100	10	
Derby G. L. Co., Derby, Conn.	160,000	100		80
Woonskt. G. L. Co. Woonskt, R. I.	150,000	100	100	
Fort Wayne G. L. Co. F. W., Ind		100		105
North. LibertiesG. L. Co. Phila.		25	29	
Wilkes-Barre G. L. Co W. B. Pa.		50	70	
Washington G. L. Co., Phila.			42	43
Pottsville, Pa. Gas Co.		50	40½	
Portland G. L. Co. Portland, Me	350,000	50	72	75
Hartford G. L. Co., Hartford, Ct	700,000	25	45½	
Boston G. L. Co., Boston, Mass.	2,500,000	500	780	785
Chelsea G. L. Co. Chelsea, "	300,000		139	
Cambridge G. L. Co., Cam., "	700,000		132¾	
Louisville G. L. Co., Louis., Ky.			127	
Cincinnati G. L Co, Cincin. O.				198
S. F. G. L. Co. San Francisco, Cal	10,000,000	100	95	96
*City G. L. Co. Montreal, Can.	1,440,000	40	137	139
*Consumers G. L(old.)Tor., Ont	600,000	50	132	
Hamilton G. L. Co. Ont.	150,000	40	112½	
Halifax G. L. Co., Halifax, N. S.	400,000	40	148	150

† These quotations represent the latest obtainable prices at which sales were made.

* These companies pay dividends equal to 10 per cent. per annum.

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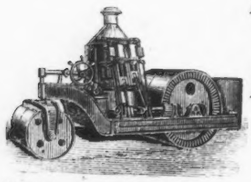

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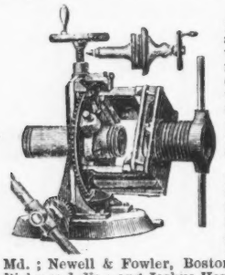

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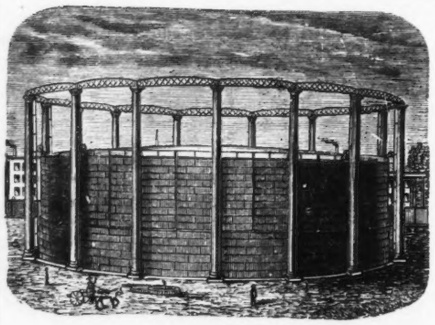

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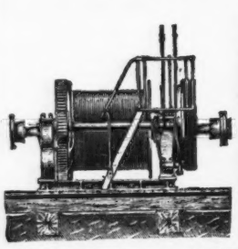

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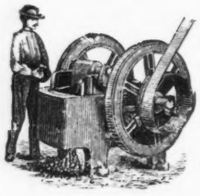

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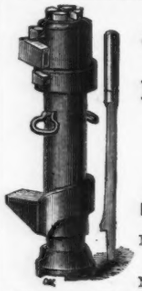

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